

IS RAID REALLY
WORTH IT?

micro mart

Computing in the know

Plus

- Edge, Office, Holographic And What Else Microsoft Has Planned
- The Technology Discount Stores That Aren't As Cheap As They Seem
- Micro Servers: 6 Tested

WINDOWS: THE BIG GAMBLE

WINDOWS 10 AND THE BIG
CHANGE AHEAD



04-10 JUNE 2015
ISSUE 1365
23>
9 771473 025081
tinyurl.com/mm1365mm
\$2.50

ASUS Transformer Book T100

Transform your mobile lifestyle

2-in-1 ultraportable laptop with 10" tablet

The ultraportable designed to surprise

ASUS Transformer Book T100 is the beautiful ultraportable that's also an 10.1-inch Windows tablet. Detach the tablet to work and play anywhere, and dock to enjoy the comfortable keyboard, smart gesture-enabled touchpad and advanced connectivity.

All-day battery life

With a battery that lasts up to 11 hours, you're free to work or play from dawn to dusk. And ASUS Instant On technology ensures that Transformer Book T100 is always responsive and ready for action!

Microsoft Office included

With a 1-year subscription to full, unlimited versions of Word, Excel, Outlook, PowerPoint, Access, Publisher and OneNote, plus 1TB online cloud space, Transformer Book T100 is ready to help you with work or school from the moment you switch it on!



CCL Code NOT01077



SPECS

Intel Atom Z3735F 1.33GHZ CPU
2GB DDR3 Memory, 11 hr Battery
Intel HD Graphics, 500GB HDD, 32GB SSD
Microsoft Windows 8, Office 365 Personal

PRICE

only
£249.99
incVAT



call: 08000 50 10 10

visit: www.cclonline.com/pc email: pcsales@cclonline.com

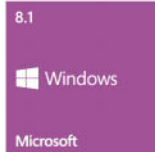
find us: CCL Computers Ltd, Inmoor Road
Off Cross Lane, Bradford, BD11 2PS

Prices correct at time of going to publishing
(5th May 2015). Images & case designs
are for illustrative purposes only call for details.
Monitors and keyboard/mice are available separately.



www.cclonline.com

CCL Computers Ltd recommends Windows



Find your perfect Gaming PC at CCL

Custom Build Enthusiast
Gaming Home & Family
 Value for Money 3 Year Warranty
 Performance Find your perfect PC at CCL

Why choose CCL for your new PC?

FREE Next Day
Delivery

FREE Help and
Support

3 Year Warranty
as Standard

CCL Elite Talon III Gaming PC



Windows 8.1
 AMD Athlon 5350 2.1GHz CPU
 4GB DDR3 Memory
 Asus AM1M-A Motherboard
 NVIDIA GeForce GTX 750
 1000GB Hard Drive
 DVD Drive
 Built-in Wi-Fi
 3 Year Collect & Return Warranty

Pre-Installed with Windows 8.1

£357.99

Inc VAT & Delivered

**GTX
750**
Graphics

CCL Elite Hawk IV Gaming PC



Windows 8.1
 AMD FX 4350 Quad Core 4.2GHz CPU
 8GB DDR3 Memory
 Asus M5A78L-M/USB3 Motherboard
 NVIDIA GeForce GTX 750 Ti
 1000GB Hard Drive
 DVD Drive
 3 Year Collect & Return Warranty

Pre-Installed with Windows 8.1

£497.99

Inc VAT & Delivered

**GTX
750Ti**
Graphics

CCL Elite Raven IV Gaming PC



Windows 8.1
 Intel Core i5 4690 3.5GHz CPU
 8GB DDR3 Memory
 Gigabyte GA-B85M-D53H Motherboard
 NVIDIA GeForce GTX 960
 1000GB Hard Drive
 DVD Drive
 Built-in Wi-Fi
 3 Year Collect & Return Warranty

Pre-Installed with Windows 8.1

£679.99

Inc VAT & Delivered

**GTX
960**
Graphics

CCL Elite Strix Gaming PC



Windows 8.1
 Intel Core i5 4690K 3.5GHz CPU
 16GB DDR3 Memory
 Asus Z97-Pro Gamer Motherboard
 NVIDIA GeForce GTX 960
 250GB SSD, 3TB Hard Drive
 DVD Drive
 Built-in Wi-Fi
 3 Year Collect & Return Warranty

Pre-Installed with Windows 8.1

£1079.99

Inc VAT & Delivered

**16GB
DDR3**
1866MHz

CCL offer a great range of PCs tailored to your individual needs from a family PC right up to a bleeding edge gaming monster!
 If you already know exactly what you want then speak with us about a custom PC made just for you!

Why not simply pick your components and we'll build it for you!

You Design It, We Build It



call: 08000 50 10 10

visit: www.cclonline.com/pc email: pcsales@cclonline.com

find us: CCL Computers Ltd, Inmoor Road
 Off Cross Lane, Bradford, BD11 2PS

Prices correct at time of going to publishing
 (5th May 2015). Images & case designs
 are for illustrative purposes only call for details.
 Monitors and desktop bundles are available separately.



www.cclonline.com

Contents

This week...

08

**Microsoft's
Windows Gamble**

08 Microsoft's Windows Gamble

According to official sources, Windows 10 will be the final 'proper' version of the popular operating system. What's going to replace it? Well, it looks like it might be a subscription service, so you'll have to pay for your OS on a regular basis. Although it's only a rumour, it's a real enough possibility to give it some serious thought – and that's just what Aaron Birch has been doing this week

18 Technology Outlet Stores

Lots of technology companies and high street retailers sell their unwanted stock via special websites or even eBay, and they profess to offer real bargains. But how true is that? Do technology outlet stores really provide great value or are you better off looking elsewhere? We've been finding out

26 Microsoft Research: Beyond Silicon Transistors

Microsoft, like many companies, is well aware of the limitation of silicon when it comes to advancing computing power. One solution to this problem could be quantum computing, but that isn't without its own unique set of problems, and Microsoft is working hard to overcome them, as David Briddock explains in the final part of this series

18

**Technology
Outlet Stores**

26

**Microsoft
Research:
Beyond
Silicon
Transistors**

46 Group Test: Micro Servers



56 Microsoft Build

46 Group Test: Micro Servers

Last time around, we looked at tower servers, and in this issue, we're shrinking things down by testing six micro servers. Why would you want one of these and, more importantly, which one should you buy? David Hayward provides some answers

56 Microsoft Build

What, other than Windows 10, does Microsoft have planned? A good place to find out is the annual Build conference, and this year, David Briddock has been following the various announcements to see what's in store for us from the people over at Redmond

60 Is RAID Worth It?

There are plenty of reasons why you might want to set up RAID at home, but is it really worth it? How much effort is required to get it up and running, and can it be done in a more straightforward manner? Mark Pickavance takes a look at your options and works out which type of RAID setup you should be using



Also In This Issue...

30 Remembering

This week's trip down memory takes us to maths co-processors

31 Component Watch

Get a great deal on an AMD graphics card

67 Top 5

Don't like fixing other people's PCs? Use one of our handy excuses not to

86 Crowdfunding Corner

Get your wallet ready, because we've got two more worthy projects for you this week

87 App Of The Week

Take control of your media with SURE

Group Test

Micro Server

- 46 HP ProLiant Gen8 MicroServer G1610T
- 47 CuBox-i4Pro
- 48 Fujitsu Primergy MX130 S2
- 49 Fujitsu Primergy TX1320 M1
- 50 WD Sentinel DS5100
- 51 QNAP TS-253 Pro
- 52 Sum up

Reviews

- 38 MSI AP16 Flex
- 39 D-Link mydlink Home Smart Plug
- 40 Acer Chromebook 15 C910
- 42 i-Rocks Rock Series K10 USB Gaming Keyboard
- 43 Urbanite XL Wireless
- 44 The Witcher 3: Wild Hunt

Experts

- 82 Ask Aaron
- 84 Ask Jason

Specialists

- 68 Linux Mart
- 69 Amiga Mart
- 70 Mobile Mart
- 71 Hardware Mart
- 72 Gaming Mart

News

- 32 The Latest News
- 53 Your Letters

Regulars

- 54 Subscriptions
- 74 Ad Index
- 76 IT Essentials
- 78 Classifieds
- 88 Logging Off



SAVE A BUNDLE

Subscribe to Micro Mart today and save 24% on the shop price.

Call 0844 844 0082

Basic annual rate

UK: £77.50

Europe: £185

Rest of World: £340

Online subscriber service

Change your address and renew your subscription at

www.subsinfo.co.uk

Email:

micromart@servicehelpline.co.uk

SUPERB MORGAN BARGAINS • WITH EXTRA 10% DISCOUNT! MASSIVE COMPUTING SALE! WITH AN EXTRA 10% DISCOUNT

Get an extra 10% OFF your new sale item or almost anything on our site!

Just visit our website today www.morgancomputers.co.uk

Enter the promotional code **MMTEN** at the checkout online and see your prices reduce by an extra 10%! OR call **FREEPHONE 0800 008 7451** and we'll do the work for you!

WESTERN DIGITAL 1TB HARD DRIVE



- Size/Bay Height: 3.5" x 1/3H
- Capacity: 1 Terabyte • Cache (MB): 32
- Interface: Serial ATA-600
- Transfer Rate: 600 MBps
- Internal transfer Rate: 110 MBps
- Buffer Size: 64 MBps
- Spindle Speed (RPM): 7,200
- Shock Tolerance Operating: 65 g @ 2ms
- Size (WxDxH): 10.2 x 14.7 x 2.6 cm
- Weight: 0.6 kg

State of the art, top specification, top brand internal hard drive

MODEL WD10EURX 1TB

WD Western Digital

Part Code: 41663

NOW ONLY
£26.96



HP 8000 ELITE SPECIAL!

Now with an incredible 8GB DDR3 RAM, a Massive 1TB HDD, WiFi and a 1GB Graphics card the reliable and powerful 3.0GHz Core2Duo Intel processor will make short work of most tasks!

- Intel Core 2 Duo E8400/3 GHz (Dual-Core)
- 3.0 GHz • 8GB RAM (installed)/16 GB (max)
- 1TB - SATA • DVD/CD • Stereo Sound
- Network: Wi-Fi & Gigabit LAN • Asus G210 Graphics
- Ultra Small: 33.8 cm x 37.9 cm x 10 cm
- Windows 7 Professional Operating System

TOP SPEC! LOW PRICE!

NOW ONLY
£224.96

Part Code: 81838

AMAZON KINDLE FIRE HDX 7" - SPECIAL BARGAIN BUY!



QUAD CORE! POWER!

Wi-Fi

2 GB RAM

amazon kindle BARGAIN

Instantly watch anytime on your Kindle Fire. Buy or rent from a huge selection of more TV episodes and Films than all TV channels put together. Subscribe to Prime and enjoy unlimited streaming of thousands of popular films and TV shows from Britain's largest subscription streaming service.

- Quad Core Processor
- Stunning HD display
- 1920x1200 HD Res
- 4Gb RAM/16Gb Storage
- Wi-Fi, Bluetooth, 3G/4G
- Fast web browsing
- Mojito OS
- Front-facing camera

CURRENT ARGOS PRICE

~~£269.99~~

CURRENT JOHN LEWIS PRICE

~~£269.99~~

Part Code: 91814

NOW ONLY
£152.96

AVG ANTIVIRUS 2015

1 Year 1 User Download Code
Delivery Within 1 Working Day via eMail



The backbone of your PC's security system - offers protection from a range of IT threats and provides the basic tools needed to protect your PC!

Protect your computer from harmful malware and viruses with this superb AVG Anti Virus pack. This pack provides protection against spyware, trojans and phishing, as well as providing a wide range of privacy options.

AVG ONLINE PRICE

~~£29.95~~

NEW LOW PRICE!

Part Code: 41185

NOW ONLY
£7.16

HP PAVILION 15.6" QUAD CORE LAPOP

Top spec full size quad core
Windows 8 HP laptop with 8Gb
RAM and a fast 1TB hard drive!



QUAD CORE!

- 1.6GHz AMD A8-4555M Quad Core processor • 8Gb RAM
- 15.6" 1366 x 768 (pixels) Hi-Res Ultra Bright Screen
- 1Tb HD • Wi-Fi • Bluetooth
- Ethernet • Silver magnesium chassis
- AMD Radeon HD 7600G Graphics
- HDMI • Only 2.3kg
- Windows 8.1 OS

NOW ONLY
£269.96

Part Code: 81889

BARGAIN!

PLUS!

AN EXTRA 10% DISCOUNT

Buy any of these products and claim a special MicroMart readers **ONLY** extra 10% discount!

Go to our website and place your order for any of these superb offers. Enter your special promo code **MMTEN** at the checkout online and see your order reduce by an extra 10%!

E&O. All trademarks are acknowledged. Prices are subject to change without notice. Our terms and conditions of trading apply. Copies are available on request.

All Prices include VAT
Monday to Friday
8.30AM TO 6.00PM

MorganComputers

follow us on
twitter

SUPERB MORGAN BARGAINS • WITH EXTRA 10% DISCOUNT!

LENOVO THINKPAD T520 15.6" LAPTOP



IBM
lenovo
ThinkPad



WINDOWS 7 HOME PREMIUM, BIG SCREEN BIG SPEC - LOW PRICE!

As new top quality! This full size laptop has almost everything. 15.6" HD LED Screen, 2.5GHz 2nd Gen i5 Processor, Webcam, Windows 7 with a FREE upgrade to Windows 10 when released. Sold with a 12 month warranty for total peace of mind. Will satisfy the most demanding & fastidious customer!

- Processor: Intel Core i5 (2nd Gen) 2520M
2.5 GHz (3.2 GHz) / 4 MB Cache
- Memory: 4 GB DDR3 ● Storage: 320 GB HDD
- Display: 15.6" LED backlight 1600 x 900 / HD
- Graphics: Intel HD Graphics 3000
- Networking: Wireless, Ethernet, fax /modem, 3G upgradable
- WebCam: Built-In ● Weight: Only 2.5 kg
- Size: (WxDxH) 37.3 x 24. x 3.6 cm ● OS: Windows 7

**SPECIAL NEW PRICE
WITH AN EXTRA
10% DISCOUNT**

£269.06 **NOW ONLY**

APPLE iPhone 4S 16GB BLACK 60% LESS THAN RRP! Refurbished & Unlocked Ready for any Network SIM card!

**Use on any of
these networks**



**.. and
many
more!**

With 12 Month Warranty

- Dual-core 1 GHz Cortex-A9 processor ● 3.5" LED-backlit IPS LCD, capacitive multitouch touchscreen with 640 x 960 pixels and 16M colors ● 8 MP, HD 3264 x 2448 pixels, autofocus, LED flash primary camera ● VGA, 480p@30fps, videocalling over Wi-Fi and 3G ● Wi-Fi
- Bluetooth v4.0 ● Accelerometer, gyro, proximity & compass sensor ● GPS with A-GPS & GLONASS ● Up to 14Hr Battery Life (2G talk time) ... and much more

**SPECIAL NEW PRICE
WITH AN EXTRA
10% DISCOUNT**

£161.96 **NOW ONLY**

**RRP AMAZON
~~£409.95~~**
 Wi-Fi 16Gb



Part Code:
489127

**PRICES
SHOWN**

INCLUDE AN EXTRA 10% DISCOUNT
Buy any of these products and claim a special
MicroMart readers only extra 10% discount!

Go to our website and place your order for any of
these superb offers at our standard discount price.
Enter your special promo code **MMTEN** at the checkout
online and see your order reduce by an extra 10%!

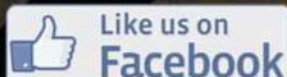
E&EO. All trademarks are acknowledged. Prices are subject to change without notice. Our terms and conditions of trading apply. Copies are available on request.

www.morgancomputers.co.uk

Or Call FREEPHONE 0800 008 7451

**All Prices
include VAT**

**Monday to Friday
8.30AM TO 6.00PM**



Windows' Big Gamble

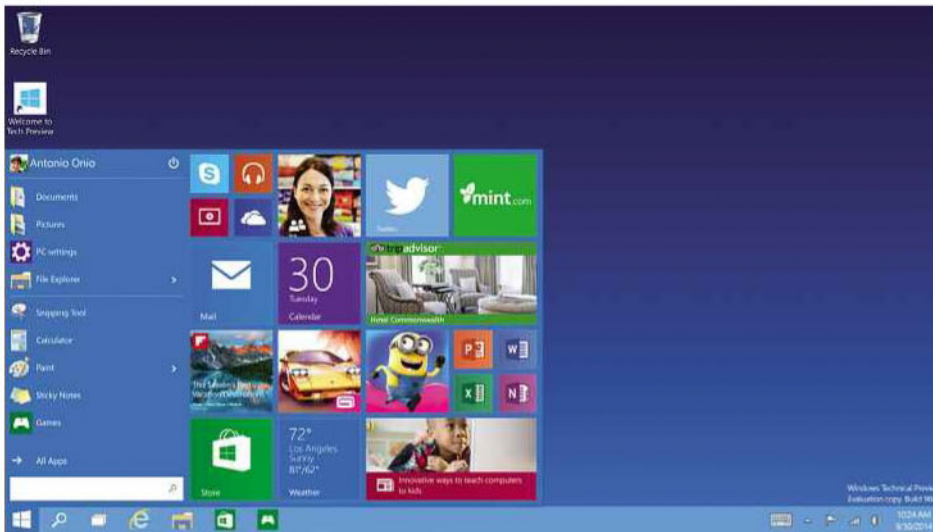
The future of Windows may be changing, as Microsoft could move to a subscription-based model. **Aaron Birch** investigates...

Despite many years of competition and various large-scale bouts of user dissatisfaction, Windows remains the most popular and commonly used OS in the world. Linux may have its place in the hearts of many, and there's a definite movement for those wishing to abstain from Microsoft's products, but the Redmond OS still reigns supreme. At least, it does for now, but with some possible major changes on the horizon, could Windows' success take a turn for the worst?

It's been rumoured and talked about for months now that Windows 10 will be the last OS of its kind, with various reports leaking out online. More recently, Microsoft

CEO Satya Nadella, who is heavily focused on the future of cloud computing, made it clear he's looking into a more service-based business. So it's looking increasingly likely that Windows 10 will not only be the last numbered Windows release, with future iterations all simply going by the name Windows, sans number, but that it may embrace a subscription model.

This has been confirmed further thanks to Microsoft employee Jerry Nixon's comments at the company's Ignite conference. Here he said, "Right now we're releasing Windows 10, and because Windows 10 is the last version of Windows, we're all still working on Windows 10."



▲ Windows 10 looks like it's going to be the last numbered version of Windows

Many have taken this as rather solid proof that Windows will no longer be the OS it is today and that a subscription and cloud-based operating system is in the near future for PC users.

to give everyone a free copy of the latest version of Windows?

Of course, that's just mere speculation, but it's not unwarranted to be wary of such ulterior motives. Microsoft hasn't

“ Ever since its inception, Windows has always strived to be the total, including all the relevant and most useful technology of the time ”

What could this mean for users? How will this change affect the current functionality and availability of Windows?

Windows 10

Currently, most up-to-date PC users are making use of Windows 8.1 – that is, those who haven't already upgraded from the popular Windows 7. Microsoft's next update has skipped Windows 9 and will be heading directly to Windows 10. This version of Windows is going to be offered as a free upgrade to users of Windows 7 and upward (including Windows Phone 8.1) for free for the first year of the OS's release. This is good news for those who want to stay up to date and run the latest version of Windows, as it means there's no extra cost involved in the upgrade. Microsoft has even said that it plans to upgrade every applicable copy of Windows, even if it's not, how shall we say, entirely legal. Clearly, something is afoot at Microsoft, something big, and it depends on users all being on the same page. What better way to ensure this than

been the most generous company in the world when it comes to its OS in the past, and its software, OS or otherwise, usually commands high prices or at least adds to the price of an OEM PC deal. Now it's giving a whole OS away for free (or an

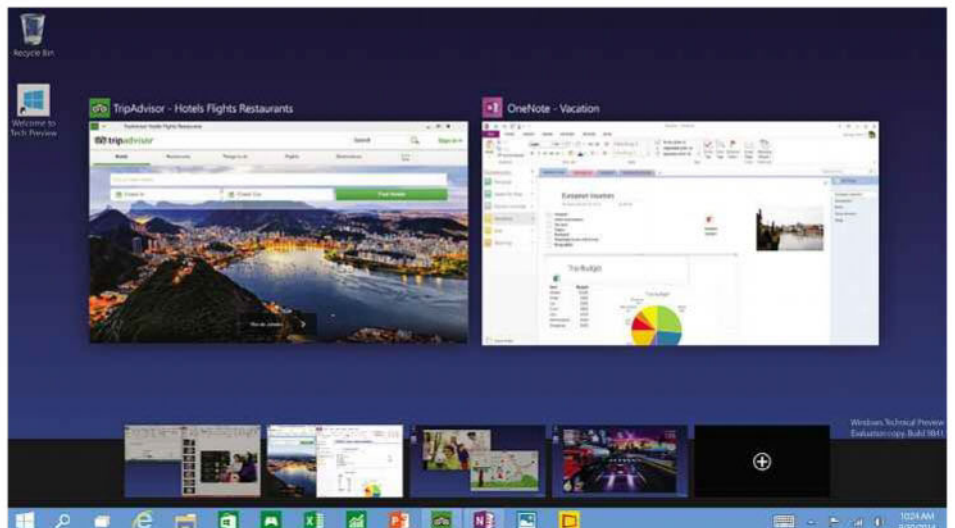
upgrade, if you want to be specific), you have to wonder.

Microsoft representatives have been reported online as stating that Windows 10 will be the last numbered version of Windows, and the delivery plan for the operating system is set to change. Instead of Microsoft's usual commitment of releasing a new OS every three years (give or take), more frequent updates will be applied in a service-based approach. Think game and mobile phone OS updates if you want an easy analogy. This would mean that the internet and cloud server will come into play more heavily than ever before, with a much greater demand for online functionality. Windows would need to be online to receive the latest updates, and new versions would also be delivered via this method.

This is a model that's served all manner of companies and service providers well, such as office applications, security tools, games and Windows' own updates. However, for an entire OS to be delivered this way, it raises some very important questions, ones that the general PC using public are understandably concerned by.

Online Required

Ever since its inception, Windows has always strived to be the total package, including all the relevant and most useful technology of the time. Microsoft has always wanted the OS to be everything to everyone, and this can be seen in the product's evolution. This evolution has enhanced and improved the system, often at the expense of other companies and technologies (we still remember you, Netscape), leading us right up to Windows 8.1 and soon Windows 10.



▲ Microsoft has confirmed things are going to change after Windows 10



▲ A fusion of old and new, Windows 10

One thing that has always been the same about Windows is its local, fully functional installation. Although Windows relies on an internet connection for a lot of features, more so with more recent releases, as well as various hotfixes and updates, the system has also been stand-alone. It can run perfectly well, albeit without some features, on a PC not connected to the internet. What's more, if you have an installation disc, it's much easier to recover a system or reinstall from scratch. At the very least, a PC or laptop can be equipped with a recovery partition containing Windows and software, which can be reverted to at any time should the need arise.

Should Windows move away from this and towards a cloud-based service, which is believed, this may no longer be possible, and the OS and its functionality will instead rely on an online connection and the cloud. This would facilitate the need for an online connection for a PC running Windows and possibly an always online one, although there's nothing pointing to this at the moment.

As we said, this isn't a new approach for many software providers, and many large-scale companies have already used this method of software delivery. Adobe is one such company to take this route, with its Creative Cloud suite of programs, moving its previously stand-alone titles like InDesign, Photoshop, Dreamweaver, Illustrator and others to a service-based system. Instead of a single, one-off payment, customers pay a monthly subscription for the programs, which includes the software and updates, as well as full support.

Microsoft has also dabbled in this area, specifically with Office, in its Office 365 incarnation. Unlike previous versions of the productivity suite, Office 365

doesn't come on a disc as it has before, but is a cloud-based, subscription service. Various packages are available, such as Home and Personal, and these command monthly fees.

Given that Microsoft has already moved one of its major products into the online, subscription sphere, Windows' future

“ Windows 10 will be the last numbered version of Windows, and the delivery plan for the operating system is set to change ”

as another such service isn't difficult to imagine, even more so when you consider the various options open to Microsoft in terms of different packages and subscription deals, such as Home, Professional, Student and so on. It would also help cut down on piracy, as it's generally harder for people to find and use online-specific software illegally, and unlike other such programs, you can hardly block Windows from going online with a firewall, as it's the actual OS of your PC. Sure, there'll always be ways found to bypass any security, even this delivery solution, but it does put Microsoft in a much better position in terms of control over its product.

Power Corrupts...

The problem with this level of control comes with power, the kind that a company can hold over its users. This is a situation that's already affected Adobe and its relationship with its own customers. Having removed the



▲ Adobe's Creative Cloud has sparked a lot of ill feeling among Adobe's user base

traditional, stand-alone Creative Suite from the market, replacing it with the subscription-only Creative Cloud, Adobe quickly upset a lot of people, so much so that a petition on Change.org was started in 2013 and signed by around 13,000 people. Many were outraged at the change in pricing, seeing the software

as a rental, rather than a viable purchase. The move was called a blatant money-grab, and it was feared that with no other real options, Adobe could hike prices up and generally control the market. The costs involved for users who don't upgrade to the latest product as regularly as others has also been questioned.

Microsoft's Office 365 success is harder to quantify. In the past, Microsoft hasn't been all that open in terms of sales figures and service take-up, but it has often insisted the online office suite has strong momentum and has been on track to be one of its biggest products. Even so, with such apparent success, Office hasn't deterred competing packages, and there are plenty of alternative suites out there. The thing is, Windows doesn't have the same amount of competition. While it's easy to uninstall an office suite and move to another, doing so with an operating system isn't quite so straightforward.

There's also the real, legitimate fear of not actually owning the software in



DREAM THE IMPOSSIBLE! THINK BIG!

VITTORIO BRUMOTTI likes WebSite X5

Road Bike Freestyler & 10 Guinness World Records™ holder

"An easy to use Web design package that doesn't need any programming skills"

MicroMart 1349



WEBSITES - ONLINESHOPS - BLOGS - IN 5 STEPS

No programming skills required
Create all the sites you want with unlimited pages
Over 1,500 customizable templates
Domain name and 12 months free webhosting included
Compatible with all the major browsers and mobile devices
Touch support
Buttons and boxes for social apps
A built-in library with over 200,000 royalty-free pictures

50% OFF COUPON CODE*

M M E V P R 1 1 M

*The offer is valid until 21/06/2015

www.websitex5.com/store

Performance without compromise



Infinity 7850K

- AMD A10-7850K APU
- ASUS® A88XM-PLUS
- 8GB HyperX FURY RAM
- Integrated AMD Radeon™ HD 8000
- 2TB Hard Drive
- **Windows 8.1**
- 3 Year Standard Warranty

THIS SPEC FROM **£499***



Vanquish HAF III

- Intel® Core™ i5-4590
- ASUS® H81-Gamer
- 8GB HyperX FURY RAM
- 2GB NVIDIA® GeForce® GTX 960
- 120GB Kingston SSD
- 1TB Hard Drive
- **Windows 8.1**
- 3 Year Standard Warranty

THIS SPEC FROM **£769***



Minerva

- Intel® Core™ i5-4690K
- ASUS® RoG MAXIMUS VII RANGER
- 16GB HyperX FURY RAM
- 4GB NVIDIA® GeForce® GTX 970
- 120GB Kingston HyperX 3K SSD
- 2TB Hard Drive
- **Windows 8.1**
- 3 Years Warranty

THIS SPEC FROM **£999***



Predator X99

- Intel® Core™ i7-5820K
- ASUS® Z99-S
- 16GB HyperX FURY RAM
- 8GB AMD RADEON™ R9 295X2
- 240GB HyperX 3K SSD
- 2TB Seagate SSHD
- **Windows 8.1**
- 3 Years Warranty

THIS SPEC FROM **£2,299***



Optimus Nebula

- Intel® Core™ i7-4720HQ
- 15.6" Matte Full HD IPS Display
- 8GB HyperX IMPACT RAM
- 2GB NVIDIA® GeForce® GTX 960M
- 120GB HyperX 3K SSD
- 1TB Hard Drive
- **Windows 8.1**
- 3 Year Standard Warranty

THIS SPEC FROM **£849***



Defiance 17

- Intel® Core™ i7-4720HQ
- 17.3" Matte Full HD LED Screen
- 16GB HyperX IMPACT RAM
- 4GB NVIDIA® GeForce® GTX 980M
- 240GB Kingston SSD
- 1TB Hard Drive
- **Windows 8.1**
- 3 Year Standard Warranty

THIS SPEC FROM **£1,349***

Order your system now with PC Specialist



/pcspecialist



@pcspecialist

Some features require Windows 8.1. Update available through Windows Store. Internet access required; fees may apply. Microsoft, and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

* Prices are including VAT and are correct at the time of printing, but subject to change.



Award winning custom PC & Laptop manufacturer

Get a PC that's more **you**



Vortex 440

- Intel® Core™ i7-5820K
- ASUS® Z99-S
- 16GB HyperX PREDATOR RAM
- 4GB NVIDIA® GeForce® GTX 980
- 240GB Kingston HyperX 3K SSD
- 2TB Hard Drive
- Windows 8.1
- 3 Year Standard Warranty

THIS SPEC
FROM

£1,599*

Quality builds at a low price
Always

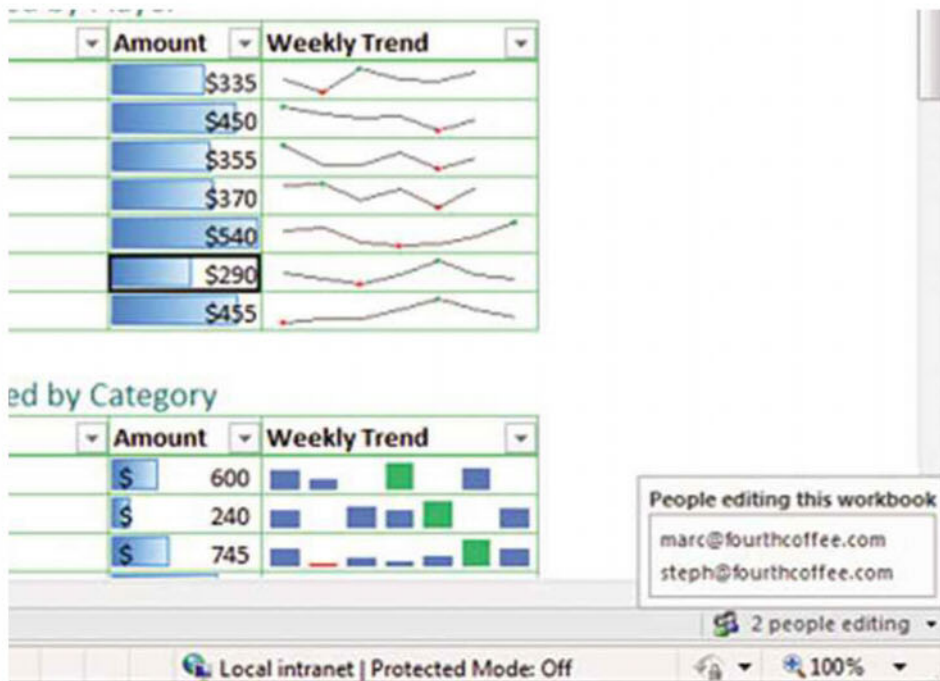
GET A FURTHER £15 OFF WITH THIS EXCLUSIVE VOUCHER CODE:

MM49T

ORDER ONLINE NOW

0333 011 7000

www.pcspecialist.co.uk



Microsoft® Office 365

▲ Office 365 seems to be a success for Microsoft

◀ Microsoft's Office 365 is already a cloud-based subscription service

Microsoft knows it has a huge user base under its thumb, which only makes the subscription-based route more worrying.

Will It Work?

Should Microsoft go ahead with a possible subscription service for Windows, with a yearly charge required for users to 'rent' a licence and receive the latest updates, will it be a move that will work? Will Windows remain to be a successful operating system and continue to dominate the market? Or will users finally be pushed too far and turn to alternatives? No one can know for sure, of course, but we can make some educated guesses using past examples.

The big question here is money and if Microsoft really will begin to charge monthly or yearly fees. Simply moving the OS to a cloud-based service doesn't mean it'll be a subscription service; it could still be a one-off payment as it is now. But that raises the question of whether people will pay for it.

Well, they certainly won't want to, even if a lower monthly price means the OS is more affordable in the short term, and as long as older version of Windows still work, many won't. Just as so many PC users already stick stubbornly to their favourite versions of Windows, even as

question, and this is something that's actually been big news over in the gaming world recently, and it only highlights the potential problems users could face.

Konami, a big name in the gaming industry, released a mysterious title called *P.T.* for the PlayStation 4. *P.T.* (short for Playable Teaser), was a horror-themed title that was revealed, on completion, to be a new *Silent Hill* game, which was in development. However, following all sorts of problems at Konami, the new *Silent Hill* game has been cancelled, and Konami has taken many steps to remove *P.T.* from existence, to the point the game has been removed from Sony's PlayStation Network servers.

How does this relate to Windows, you may ask. Well, it's all down to digital-only products. The whole *P.T.* issue has highlighted the fragility of software that's only distributed digitally and controlled by a company. Should that company, in this case Konami, wish to do so, it can remove a whole program from the market, effectively erasing it from existence. Now, this isn't something we see Microsoft doing with Windows, of course, but it still begs the question: what if?

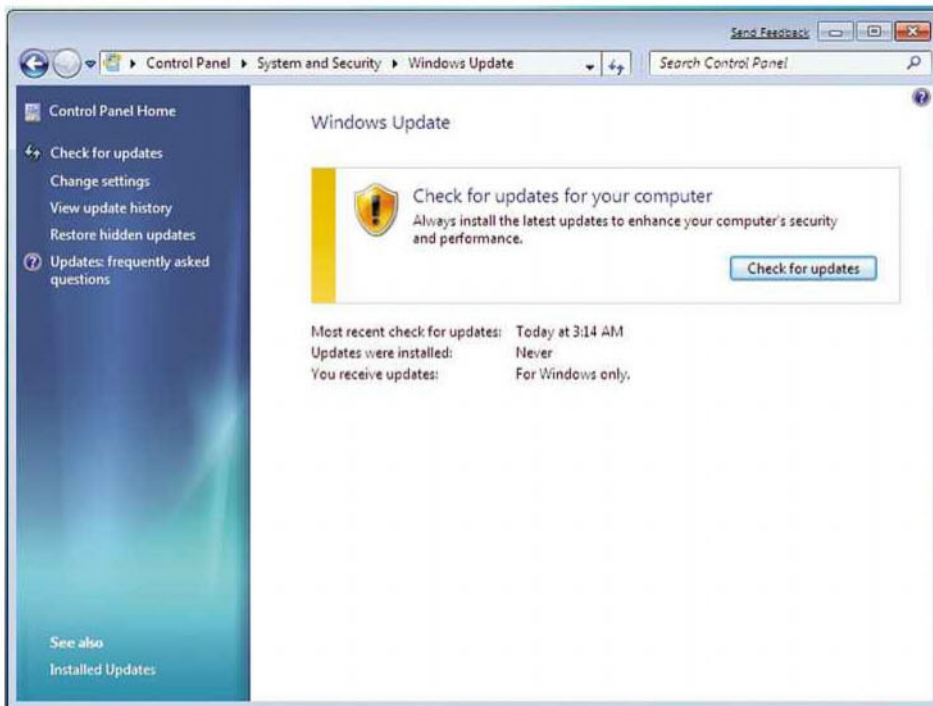
Imagine if Microsoft had already taken this route with Windows 7 or even XP. Those people who clung, and still do, to their favourite OS could be forced to upgrade if Microsoft stopped the corresponding cloud service. After all, that software rests on Microsoft's servers, and you're just renting it; you don't actually own the program. Microsoft could legally

remove it, making it unavailable to you, and you'd have no choice but to upgrade. Simply not owning a physical disc or even a copy on a recovery drive could mean users in future will have very limited options when it comes to upgrading, instead being forced to move on, whether they like it or not.

This also calls into question Microsoft's near monopoly on the OS market. Although there are alternatives such as Linux, which we mentioned earlier, it's not as though Windows PC users can easily call another software provider for a better quote, should they dislike the pricing of the package or find the software unsuitable. If you use Windows on a PC, you're pretty much stuck, so



▲ Konami demonstrated that digital-only products can be quickly made unavailable with *P.T.*



▲ *Windows updates have always been free, but would a subscription model change that?*

far back as Windows 98 and prior in some cases, so too will people remain on the standard Windows 10 or even 8.1 if they so wish.

Microsoft will be well aware of this, of course, and further steps to entice new users will be taken, such as those already taken to force users to upgrade

often the first to make use of new OS technology, not just leaps in hardware.

Moving to another OS for this hobby isn't really an option either. Games often take a long time to be released for other operating system like Linux, if at all, so those with such pastimes will be left with few options.

“ The big question here is money and if Microsoft really will begin to charge monthly or yearly fees ”

to Windows 8, like discontinuing support for Windows XP. If a user is technically proficient and able to support their own PC and older OS, they'll likely continue to do so and stick with an older OS. Taken as a percentage of the whole Windows market, however, this is a relatively small portion, so Microsoft knows it has a lot of customers who would have no choice but to upgrade to the new service.

Power users who require the latest updates for compatibility, such as gamers, would also be in a sticky situation. Plenty can be done to make games run on older hardware, but often new releases need the latest DirectX and other system-specific functions, so not upgrading would be an issue here too. Games are

Those who don't game but who still want to be up to date and wish to use new software will have no choice either, especially given the possible subscription nature of OS updates. This software includes security.

We all know that as good as Windows may be, it's also the target of many attacks, and security holes are constantly being found and patched. In a subscription environment, it would mean you'd have to pay to stay up to date, and if you don't, you may be running an unsecured system. This is, of course, the case for those who choose to run older versions of the OS, like XP, but at least they have the full OS, owned and operated by themselves.

Here you wouldn't even have that, as the OS wouldn't technically belong to you. There's something to be said for the desire people have for actually owning something, be it for a sense of actual, physical property for their money or the security of having a copy on hand regardless of their connectivity status.

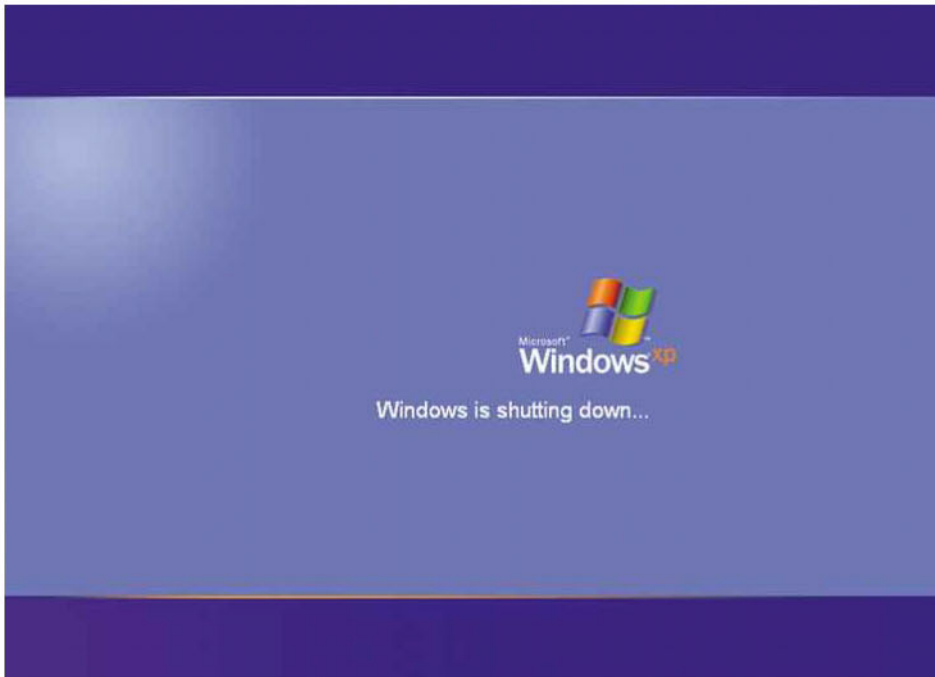
In future, Windows may not offer this possibility and will also come with a lack of choice. It could make for an oppressed Windows community and one that, even more so than today, uses the software begrudgingly, owing to a lack of viable options.

A fact we can't ignore is the likes of Android and iOS offering free updates and whole upgrades for free. Mobile phone users would kick up a storm if they had to pay for such upgrades (which is kind of the case with some phone upgrades), so an online OS charging for the same would be a hard pill for some to swallow.

A possible silver lining is the fact people have claimed that the OS will be shaped by user feedback more than before. This could potentially make the OS a lot more flexible and more geared towards actual change and evolution based on its user base, instead of the vision of a room of software designers



▲ *Mobile phone OS upgrades are free, so charges for Windows may be met with anger*



▲ Many people still use XP due to an unwillingness for change and a fondness for the older OS

who can often take too much pride in their work, resulting in a lack of change.

There's no denying this could be a good thing, but with such overall control of the market and many past examples of Microsoft not listening or responding to customer feedback (such as Windows 8), this may not be the case. On the contrary, with an online-only subscription model and software that can be altered and even discontinued at any time, Microsoft would be able to dictate the design of the OS even more than ever before.

This could even come into play in terms of contracts and agreements. Just as with many services we pay for these days, such as mobile phones, cable TV and internet, Microsoft could slap minimum contract terms on the OS, meaning you'd be tied into a subscription for the length of the contract. This would mean you'd be stuck with an OS or at least the cost of the subscription, even if you don't want to use it. Should a change be implemented that you don't like or want, you'd be stuck with it.

On The Flip Side

Okay, so we have an idea about how bad it could get, but what about the good? Microsoft may not be the evil, scheming company many see it as. A move to a cloud-based service could actually be a good thing for many.

For one, having just a single OS, without the occasional need to upgrade to a whole new system could be much

more convenient. As Windows will no longer be numbered or released in traditional, major versions, the one copy of Windows you run will always be the same, only updated on a regular basis, with new features added as and when they're available. This would also make the system more secure in some ways, and if there is a subscription service, updates would be a higher priority, as

“ There are many users, even today, who use older versions of Windows and don't mind doing so ”

they'd be paid for, instead of being free roll-outs, as they are now.

The upheaval new versions of Windows can cause, such as software or driver compatibility problems, could be eradicated, as the OS will stay essentially the same, evolving in a more fluid and constant manner. This could be a major benefit for software and hardware developers.

It's also important to note that not everyone believes a cloud-based Windows would even be subscription-based. Microsoft has denied this before, and even now it's still not entirely clear what this future may be. If there's no charge, other than a one-off licence, a lot of the

possible problems people have wouldn't be all that important.

The XP Effect

Although a cloud-based Windows, one that doesn't push out major versions every couple of years, could be good in some ways, it also comes with many downsides, chief of these being possible added costs and subscriptions and the lack of control the customer has. It's clear from the feedback you can see online that the move would not be popular with the public, but how many big changes that Microsoft has made in the last few years have been?

From Microsoft's point of view, it also has to contend with the user mindset of older is often better. As we said earlier, there are many users, even today, who use older versions of Windows and don't mind doing so, even if they're not secure and won't run the very latest software. Faced with the possibility of a subscription and no physical disc, this would surely have little effect but to galvanise this resolve.

Windows 8 proved that big changes are really not welcomed by a large portion of PC users, and as big as we may have considered Windows 8's changes to be, they pale in comparison to the differences that would come with a cloud OS, not to mention the requirement for an internet connection. No matter what Microsoft

thinks, there are still plenty of people without a reliable internet connection or any form of connection whatsoever, and in these cases, a cloud version of Windows is simply not an option, meaning Microsoft would lose customers by default.

Until Microsoft officially outlines any possible plans for future version of Windows, in clear black and white, there's going to be more and more speculation. This kind of speculation rarely leads to people considering good things, hence the overwhelming concern people have over the future of Windows. Until then, we'll have to see how Windows 10 performs. [mm](#)



cube

DESIGN YOUR ULTIMATE CUSTOM PC

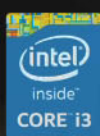
Box Limited recommends Windows

8.1
Windows
Microsoft

Intel
X99
Available
Now!



CASE



CPU



GRAPHICS



STORAGE



+ RAM, COOLING, MOTHERBOARD & MORE

YOUR PC - YOUR CHOICE - DEFINE YOUR DESTINY!

Configure yours now at box.co.uk/custom

Cube Panther Gaming PC



- MSI NVIDIA GeForce GTX 960 2GB
- Intel Core i5-4460 CPU
- **Windows 8.1**
- 8GB DDR3 HyperX RAM
- 1TB SSHD
- 2 Year Warranty



From **£699***

Mini Phantom Gaming PC



- MSI NVIDIA GeForce GTX 960 2GB
- Intel Core i5-4690K CPU
- **Windows 8.1**
- 16GB DDR3 HyperX RAM
- 1TB SSHD + 120GB SSD
- 2 Year Warranty



From **£999***

Cube DS200 Gaming PC



- MSI NVIDIA GeForce GTX 960 2GB
- Intel Core i5-5820K CPU
- **Windows 8.1**
- 16GB **DDR4** HyperX RAM
- 1TB SSHD + 240GB SSD
- 2 Year Warranty



From **£1199***

Buy online at www.box.co.uk Or visit our Birmingham Store



*Prices & offers are correct at time of going to press and are subject to change without notice. Nothing in this advert forms part of any contract. Prices are inclusive of VAT at the current rate of 20%. Box.co.uk is a trading name of Box Limited.



Technology Outlet Stores Deal Or No Deal?

We examine look at whether manufacturer and retail discount sites are really as impressive as they make out

Rich or poor, good value is something we can all appreciate. For regular people, that might mean standing in a supermarket aisle, trying to work out if the reduced price double pack of Jaffa Cakes is actually cheaper than just buying two separate packs at their normal price. For the billionaires of this world, things are a bit different, but the desire is the same. No, they probably don't even know what Jaffa Cakes are, but they still like a good deal, even if they don't actively pursue it:

why pay £20 million for that Fabergé egg when you can pay £15 million?

Sadly for us, we're not overly familiar with priceless jewelled eggs, but we've certainly spent far too much of our lives making on-the-spot calculations in grocery stores, because we, like many of you, appreciate a bargain, and we don't want to spend more than we have to. That's true no matter what we're buying, whether it's cars, houses, insurance or, of course, technology.



Obviously, you can look at eBay auctions or check out specialist refurb companies for deals, but another option is online outlet stores. These are run by retailers and manufacturers themselves (including Argos, Tesco, Sony, Panasonic and more), so they can sell returned and clearance stock. Some of them operate through eBay, while others exist on their own dedicated sites.

We looked at a few of these online stores, choosing a small selection of items at random, to see how much they're asking for their unsold products. Some of the results may surprise you...

Sony Outlet Store (outlet.sony.co.uk)

Sony sells its own refurbished products through this dedicated site. 12-month warranties come as standard, as does free delivery.

Sony DSCHX50 20.4MP Digital Camera

Original price: £279

Deal price: £136.72

Who wouldn't want to save £142 on a digital camera? Yes, £142, making this smart snapper less than half price! That's a pretty good deal, especially when you take into account the free delivery. But it's also the case that for £30 more you could buy this same camera brand new from Amazon, so Sony's official saving was likely based on a fairly old price. It's possible this camera was used once and then returned, but there was no way of knowing for sure, so we weren't convinced it was worth the small amount we could have saved.

Sony KDL55W829B 55" TV

Original price: £800

Deal price: £559

Next, we decided to up the stakes a bit and look at a 55" TV, complete with active 3D and wi-fi. This was the cheapest 55" screen in stock at the time, but it still offered a potential saving of £240. Looking at well-known retailers, John Lewis, Richer Sounds and Amazon all had this product at £779, which is pretty close to the value that Sony assigned to it. Even if we consider the best price we found, £719 from Hispek.com (a Google-certified shop), that meant we could still make a saving of £160.

Xperia Z3 8" Tablet – 32GB Wi-Fi

Original price: not listed

Deal price: £309

This was a bit of a confusing one. When we looked, there were a couple of tablets, including this one, listed on the Sony site, which didn't seem to have any discount applied to them, in spite of them

being refurbished. Indeed, pretty much every retailer we looked at – including Argos, Amazon and John Lewis – was selling this particular model for the same price. Yes, it might be as good as new from the Sony outlet, but it still wasn't new. And when the total saving is a big fat nothing at all, it completely defeats the point of buying refurbished goods.

Overall Bargain Rating: 7/10

Sum up: Apart from the tablet price, which could be a mistake, savings ranged from modest to significant. The price cuts on Sony's site weren't massive, but you'd have little to lose from giving it a go.

Argos eBay Shop (stores.ebay.co.uk/Argos)

Although Argos sells new items through eBay, it also has clearance and refurbished sections here. But does being on eBay actually translate to good value? After all, as a high street retail store, it's used to charging more than you'd find on many websites.

Acer X113H 2800 Lumens Projector

Original price: £249

Deal price: £129.99

With a resolution of 800 x 600, this refurbished projector was by no means a high-end product, but it would still set you back 250 quid if you bought it brand new from Argos. We found it £10 cheaper from Acer itself and for £215 from Amazon, but that was nowhere the kind of saving offered by Argos on eBay. And because Argos offers a free 12-month warranty on its items, we wouldn't need to worry about it breaking down as soon as it arrived.

Samsung Series 3 11.6 Inch Wi-fi Chromebook

Original price: £199

Deal price: £129

With a 1.7GHz processor, 16GB of storage and 2GB of RAM, this refurbished Chromebook wasn't exactly a powerhouse of a machine, but even at full price it would be cheap enough to justify its limitations. With £70 lopped off, it represented even better value – and this was no fake discount either: other retailers really were selling this system for around £195 to £199.

Lenovo Yoga 10.1" 32GB Tablet

Original price: not listed

Deal price: £179

This Android tablet came from Argos's clearance section on eBay, so it was brand new and unopened. We couldn't find a





price on the Argos website, presumably because it doesn't sell this particular version any more, hence its presence here. It was an old model, and it seemed Argos wasn't not the only one clearing it off its shelves: a search for it on Amazon revealed one seller with only seven units left, offered at a price of £197.99. So even though this was a brand new item, we could have saved £20 here.

Overall Bargain Rating:
8/10

The range of discounts varied a lot in Argos's

eBay store, but there were some impressive savings to found, particularly in the company's refurbished store. 12-month warranties come free with many products too, so if you're in the market for a bargain, it's worth checking out.

Currys & PC World eBay (stores.ebay.co.uk/Currys-PC-World)

Like Argos, as well as having clearance sections built into their own websites, these two brands are also represented on eBay, where there are deals on refurbished, clearance and otherwise new items. Like Argos, it's accustomed to charging more than online retailers, so it's interesting to see what it regards as a good deal.

Apple MacBook Air 11.6" MD711B/B

Original price: £749

Deal price: £689.97

Here we had a refurbished, 128GB version of this laptop, with 4GB of RAM, a 1.4GHz i5 processor and a 12-month warranty. It's a decent machine but was this a price any good? This may not seem like the fairest of tests, because Apple products tend to keep their value, but a quick web search revealed just how terrible PC World's 'bargain' was. BHS Direct, for example, had this listed at £648 brand new. And if we wanted to buy the very latest edition of this laptop, we could get it for £749 directly from Apple (we also found it for around £600 from a

few companies we hadn't heard of), suggesting that PC World needs to update its price list before applying discounts.

Lenovo Erazer X310 Gaming PC

Original Price: £799.99

Deal price: £659.97

This came from the clearance section of the eBay store, and its condition was listed as 'Used' rather than refurbished or reconditioned, but it was in fact an open box product, which means it was pretty much new. With 16GB of RAM, a 1TB SSHD, an AMD Radeon R9 255 GPU and a 3.6GHz i7-4790 processor, it looked like a decent system with a fairly hefty price cut. Most other retailers, like John Lewis and Lenovo itself, were selling it at the £799.99 RRP, but it was listed on Amazon for £764.35 (it also claimed to have a 2TB SSD but customer reviews suggested this was a mistake). Ultimately, a buyer could have saved £140 here on something that was essentially new, but because it was listed as used, it came with only a three-month warranty, which is appalling for such an expensive purchase.

Samsung Note GT-P5110 10.1" Tablet

Original price: not listed

Deal price: £244.97

PC World/Currys got off to a bad start with this one. The code GT-P5110 represents the Galaxy Tab 2, not a Note device. Looking at the specification in the listing, though, it seemed that the product on sale was in fact a wi-fi Galaxy Note tablet, with a 1.4GHz quad-core CPU and 16GB of storage, which has the model number GT-N8010, and which originally retailed for around £360 – in 2012! These days, you can find this same tablet for £166 brand new from Scan.co.uk or from various other retailers, all charging less than PC World was here. Even if it was actually the Tab 2 (also from 2012), you can find that on Amazon for £186. We're not sure why the less powerful Tab 2 costs more these days than the Note, but whichever one PC World/Currys was selling, it clearly had no idea how much it should charging for it. And it was only refurbished to Grade B, so wasn't even going to be like new, and it only came with a six-month warranty.

Overall Bargain Rating: 4/10

There were some savings to found in this eBay store, but PC World and Curry's need to do more to compete with better value shops. Selling refurbished goods for more than other companies sell those same items is a complete joke. If you're desperately searching for a good deal on something, it's worth stopping by this eBay store if you've run out of other options, but otherwise you're better off looking elsewhere.



TP-LINK®

Networking Provider of Choice for Team Dignitas
International eSports Professionals



UNLEASH YOUR INTERNET WITH WIRELESS AC SO YOU CAN DO MORE, FASTER

ROUTERS • POWERLINES • RANGE EXTENDERS



team-dignitas

One of the World's Leading eSport Teams.



TP-LINK®
The Reliable Choice

uk.tp-link.com

[/tplinkuk](https://www.facebook.com/tplinkuk)

[/tplinkgaming](https://twitter.com/tplinkgaming)

amazon.com

dabs.com

ebuyer.com
technology delivered

[OVERCLOCKERS UK](http://overclockers.uk)

[SCAN](http://scan.co.uk)



Panasonic eBay (stores.ebay.co.uk/Panasonic-Refurbished-Outlet)

Rather than taking Sony's approach of hosting its own discount store, Panasonic sells refurbished goods through eBay. All products here offer a free 12-month warranty and free delivery.

Panasonic Viera TX-47AS802B 47" 3D LED TV

Original price: not listed

Deal price: £499

This 1080p screen was offering passive 3D rather than the more expensive active variety, but 500 quid for a 3D TV of this size was nothing to be sniffed at. Many stores we looked at were selling it for a grand or more, and the cheapest we found it brand new (and in stock) was £689 from www.hughes.co.uk. So Panasonic had knocked nearly £200 off the price here, which is nothing short of fantastic.

Panasonic SC-BTT405EBK 5.1 Surround Sound System

Original price: not listed

Deal price: £99.99

Again, the original retail price wasn't stated, but according to Amazon, it was £279. That must have been quite some time ago, though, because Amazon was now selling this surround sound set for £199.99, making this eBay deal appear to be half price. However, we also found it at www.wesellelectricals.co.uk for £139 with free delivery, which took the shine off that somewhat. Still, a £40 saving isn't bad.

Panasonic Lumix DMC-LX100EBK 12.8MP Camera

Original price: not listed

Deal price: £499

With a price this high, we knew this was no ordinary compact camera, and features like 4K video recording proved that. Quite a few retailers wanted more than £600 for this camera, but we found it on Amazon for £550, so the discount for buying this refurbished unit from Panasonic wasn't as impressive as some of the others in the firm's eBay store. Nevertheless, it was still a decent portion of the price that had been lopped off, so it was well worth considering.

Overall Bargain Rating: 9/10

Not only were some of the price cuts in Panasonic's eBay store huge, but they were refurbished by the manufacturer itself, which naturally has a higher degree of understanding of these products. And the 12-month warranty will give buyers reasonable peace of mind. It doesn't have a huge number of products on sale at any one time, but what it does have is well worth checking out.

Apple Store (store.apple.com/uk/browse/home/specialdeals)

Due to the nature of the Apple brand, its products often maintain their value for a longer than goods from other companies. That also means dramatic discounts are few and far between. However, all items in its discount store are Apple certified to be as good as new and include a one-year warranty.

iPod Touch 16GB (5th Generation)

Original price: £159.99

Deal price: £135

This is actually the current generation of Apple's market-defining media player, and the refurbished example we found knocked off around £25 – not a massive saving but enough to give it second glance. However, a quick web search revealed that John Lewis, Currys and Tesco, among others, were selling this same model brand new for £139, which made a mockery of Apple's so-called discount.

iPad Air Wi-Fi 32GB

Original price: £359

Deal price: £309

Although this is an older version of Apple's thinned-down tablet, it still sells them brand new, for around £360, so this looked like a pretty good deal. Predictably, though, Apple's own valuation of this product didn't line up with what other retailers seemed to think. Most high-street stores had this priced at £319, including John Lewis, which was offering a free two-year guarantee as well. It's also worth noting that fonis.com (admittedly not a company we'd heard of) currently had this iPad priced at just £260, making Apple discount seem even more ludicrously stingy than it already was.

15.4" MacBook Pro With Retina Display

Original price: £1,599

Deal price: £1,359

With a 2.2GHz Intel i7 quad-core processor, 16GB of RAM and a 256GB SSD, this was a typically desirable but also massively overpriced laptop from Apple. Getting £240 off, then, seemed a tempting prospect, but once again it was a price cut that seemed to be based less on what the product was worth and more on the fact that Apple apparently lives in La-la Land. We found a new one of these on Amazon for £1,298, which is a good deal less than what Apple thinks its products are worth when refurbished.

Overall Bargain Rating: 1/10

Either Apple has no idea what prices other retailers charge for its products or it just doesn't care. The discounts we found on refurbished goods were so pathetic, we can only presume you're being charged a premium for the privilege of using Apple's shiny website rather than someone else's.

Tesco Outlet eBay (stores.ebay.co.uk/Tesco-Outlet)

Like Argos, Tesco Direct also operates both a clearance site on its own domain as well as



supplying quality refurbished **computers, laptops & peripherals**

Get the
latest tech
at **affordable**
prices.

FREE
NEXT DAY
DELIVERY

**PRICE
MATCH
PROMISE**

**[WE WILL NOT BE
BEATEN ON PRICE]**



HP 8200 Elite SFF

Intel i5 Quad Core 3.2Ghz
4GB DDR3 Memory
500GB Harddrive
Windows 7 Pro 64Bit
1 Year Warranty



189.99
ex VAT

DELL E6220

Intel i7 2.8Ghz
8GB DDR3 Memory
128GB SSD Harddrive
Windows 7 Pro 64Bit
1 Year Warranty



239.99
ex VAT

Lenovo M91p

Intel i7
Quad Core 3.4Ghz
4GB DDR3 Memory
250GB Harddrive
Windows 7 Pro 64BT
1 Year Warranty



199.99
ex VAT

Call us today on
0161 745 9720
or visit **www.gigarefurb.co.uk**

All our products come with
1 year warranty

an eBay outlet store, which is what we're looking at here. And there's one big difference: it sells a small percentage of its stuff through the auction process, as well as selling things at set prices, so we're going to check out twice as many products to accommodate both. One-year warranties come as standard on all products, unless stated otherwise.

Asus x550ca-cj683h 15.6" Laptop

Original price: not listed

Deal price: £190 + £4.99 p&p

Ending after 27 bids, someone won this 1.5GHz machine, with 6GB of RAM and a 750GB hard drive. It had an RRP of around £450, and at the time of writing, it was being sold on Amazon for £320. Like many of the items that are auctioned off, though, it came in a plain brown box, rather than the original packaging. It's also often the case that accessories or user manuals may be missing (although that wasn't the case here). Ultimately, though, whoever bought this got themselves a reasonable laptop for an impressively low price.

LG 42LB5500 42" LED TV With Freeview

Original price: not listed

Deal price: £200 + £9.99 p&p

It took 39 bids to reach this price, which isn't bad considering a new one would set you back £279 from Argos. However, it was missing one very important part: the stand. We can't possibly know whether the buyer saw this in the listing or not, but if they did miss it, then they can be comforted by the fact that the set was "SUITABLE FOR WALL MOUNTING.(WALL MOUNT NOT INCLUDED)". This was either a bargain or a complete nightmare, but was a good example of what can be missing from Tesco auction items and shows how important it is to read the company's listings carefully.

Microsoft Surface 2 64GB

Original price: not listed

Deal price: £467

Now we move on to Tesco's set-price eBay sales, with the second generation of Microsoft's ludicrously priced Windows 8 tablet. This wasn't the Pro version, so it was running the now discontinued RT version of Windows, making this a pretty poor buy at any price. There weren't that many other shops selling this model, but we did manage to find some on Amazon for £459.99, so whoever's running the Tesco eBay account clearly

needs to pay more attention to the market value of its products.

Buffalo LS-X2.0TL-EU 2TB

Linkstation NAS

Original price: not listed

Deal price: £59

Another discontinued item, this offered 2TB of network storage for less than £60, which is not bad at all. Again, Amazon was one of the few places still selling it, and it cost £74.99, so Tesco's price represented a reasonable if not astounding £15 saving. Its condition was stated as new, so if you wanted this product, here would have been a good place to get it.



Galaxy Tab 3 10.1" 16GB Tablet

Original price: not listed

Deal price: £129

Driven by a 1.6GHz dual-core Intel Atom processor, this tablet, first released in 2013, wasn't a speed demon by today's standards, but it was still a 10" tablet with a 1280 x 800 resolution for less than £130. The cheapest we found it new elsewhere was £169 from Very.co.uk, so at the very least, we could have saved around £40 on this reconditioned device.

Overall Bargain Rating: 7/10

When it came to Buy It Now prices, Tesco's eBay store sometimes made some strange decisions, but in general there were some decent deals to be found. What really lifted it, though, were the auctions, where we discovered some dramatic price cuts for products that were perhaps missing a couple of non-essential items. Well worth a look, we say.

Conclusion

Our relatively small-scale study here was admittedly highly unscientific, limited as it was by the confines of a magazine article, but nevertheless it did give us a reasonably good idea of the range of deals on offer. Ideally, we would have looked at the exact same products for all the stores, but that simply wasn't possible, because they don't stock the same things.

Also, we only looked at a selection of online outlet stores here, so it's worth bearing in mind that there are quite a few more that could be hiding some outstanding bargains – or, indeed, nothing worth buying at all. Just search for the name of a brand followed by 'outlet' and you should easily find whether or not particular companies run these kind of stores. From Acer to Asus and Dell, there's often a reasonable amount of money to be saved, as long as you don't mind buying refurbished or discontinued goods, some of which might be missing non-essential items.

Nearly all the sites we looked at had at least a few deals that we'd definitely consider ourselves, and in terms of sites that didn't, it was the usual overcharging suspects of PC World and Apple (although in Apple's defence, you do get a little extra peace of mind from knowing that your new computer or gadget has been refurbished by the actual manufacturer). And because one-year warranties are nearly always offered, you can rest assured that what you get won't be a complete dud.

So if you're in the market for a bargain, we wholly recommend you try out some of these websites and eBay stores. Just don't blame us if you get carried away and end up buying five cut-price TVs you don't need. [mm](#)



MAGBOOK

Build your own Android App

EXCLUSIVE

**40%
OFF**

Basic4Android



Create your own game

Step-by-step advice

How to make money



ONLY
£9.99

ON SALE NOW

Order your print or digital MagBook
at **magbooks.com**

MICROSOFT RESEARCH

Beyond Silicon Transistors

David Briddock investigates if Microsoft Research lab team can crack the quantum computing puzzle

In this series we're uncovering some of the most interesting and innovative technology projects from Microsoft Research lab teams across the globe. This time the theme is Microsoft's journey into new types of computation using quantum computing theory and techniques.

The Promise of Quantum Computing

Despite enormous year-on-year advances in miniaturisation and performance, all commercial computing platforms, from PC to supercomputer, are still built around the Von

Neuman architecture, first described in 1945. But a quantum computer is a very different proposition, where the silicon transistor is replaced with a radically new kind of processing engine.

Quantum computing is a field of research that applies the principles of quantum physics and new directions in materials science to build a type of computer that leverages quantum effects for computation. Beyond creating quantum computer hardware, this field also includes the study of new kinds of algorithms specifically coded for quantum computation environment.

“The hub of operations for Microsoft's quantum computing studies is Station Q”

Neuman architecture, first described in 1945. But a quantum computer is a very different proposition, where the silicon transistor is replaced with a radically new kind of processing engine.

Quantum computing is a field of research that applies the principles of quantum physics and new directions in materials science to build a type of computer that leverages quantum effects for computation. Beyond creating quantum computer hardware, this field also includes the study of new kinds of algorithms specifically coded for quantum computation environment.

Bits to Qubits

In a conventional computer, transistors manipulate bits of information, and each bit

mathematically related to the individual probability of each direction.

Quantum computing takes advantage of this principle, firstly to represent multiple values with a separate probability for each value, and secondly to evaluate many possible solutions simultaneously rather than one at a time.

Classic Vs Quantum Computation

Let's compare a classic versus quantum 8-bit computation. When a simple 8-bit everyday CPU performs a calculation, it uses specific values between 0 and 255 (2 to the power 8). However, because of the weird nature of quantum physics, a qubit can be both 1 and 0 at the same time.

What does this mean in practice? Well, an 8-qubit machine performs calculations with all values between 0 and 255 simultaneously so, in theory, any reasonably sized quantum machine will compute at phenomenal speeds. In fact, it could potentially break today's unbreakable cryptography codes almost instantaneously.

Nevertheless, for many problems, quantum computers will be no faster than conventional computers, but for certain problem types – like searching databases, breaking cryptographic codes or simulating large, complex physical systems – a quantum machines should be dramatically faster than any classical computing system.

If the scientists are right, their research could lead to the design of computers that are far more powerful than today's supercomputers and could solve problems in fields as diverse as chemistry, material science, artificial intelligence and code-breaking.



▲ D-Wave Computer

The Qubit Numbers Problem

Scientists already know there's more than one way to create a qubit (see Qubit Devices boxout). Each approach has its own problems, but by far the biggest problem for any quantum computing system is one of 'noise' – the effect of external interference from environmental conditions such as temperature and the many forms of electromagnetic waves present in the physical world we live in.

Noise and other problems mean that even today most quantum computers only have a few qubits. In fact, researchers have been quite pleased to develop prototype systems that contain three to seven qubits.

However, solving real-world and scientific problems requires lots of qubits – certainly in the hundreds, but ideally in the thousands. With this kind of setup, the 'noise' problem could be addressed by assigning a high proportion of the qubits to error correction duties.

D-Wave Systems

Nevertheless, Canadian company D-Wave Systems has created what it describes as a commercial quantum computer. The current D-Wave quantum computer has over 500 qubits, and there are advanced plans for our 1000-plus qubit system in the near future.

Yet despite financial and technical research support from Nasa, Google and Lockheed Martin, there is considerable scepticism that a D-Wave computer could actually perform significantly better than existing supercomputers, especially for the kind of scientific problems Microsoft is hoping to address.

So is the jury still out on D-Wave Systems' usefulness for answering deep scientific questions.

Station Q

Despite the difficulties, Microsoft is keen to make progress on solving today's hard scientific problems, which would take a conventional supercomputer

Qubit Devices

Here are four popular options to create a qubits device:

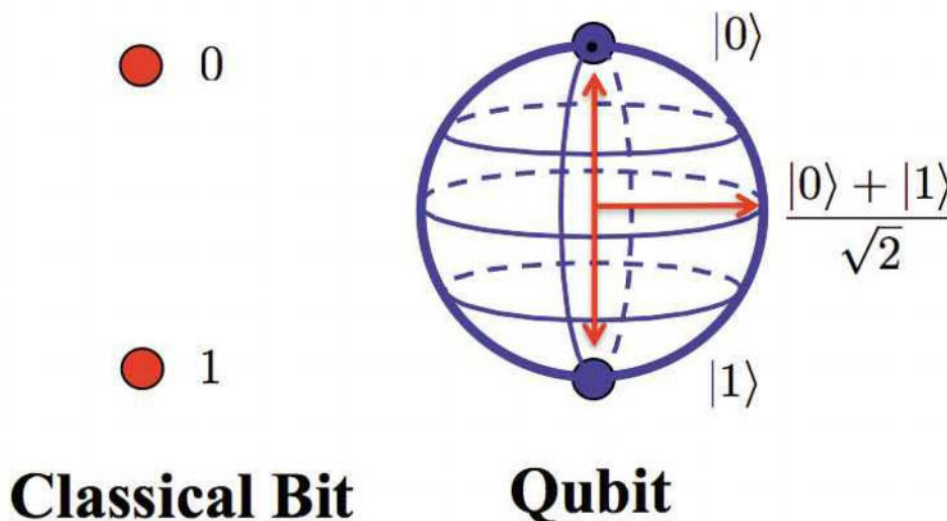
- Ion traps use light and magnetic fields to trap ions or atoms.
- Optical traps use light waves to control particles.
- Quantum dots are fabricated from semiconductor materials and designed to manipulate electrons.
- Superconducting circuits encourage electrons to flow without resistance by cooling specific materials to very low temperatures.

longer than the age of the universe to solve. And it believes a new quantum approach is required – one that pushes the frontiers of what's possible.

The hub of operations for Microsoft's quantum computing studies is Station Q, which has a name that wouldn't sound out of place in a Bond movie or World War 2 code-breaking film. This particular Microsoft Research lab (goo.gl/5YN5Qz) is located on the campus of the University of California, Santa Barbara.

Station Q is a melting pot of researchers, theorists and experimentalists from a variety of disciplines such as mathematics, physics and computer science. It's also established numerous partnerships with academic and research institutions, in the US and from around the globe.

Recent appointments include Burton Smith, the well-known supercomputer designer who moved from Cray in 2005 and who leads the quantum hardware design group. Smith himself managed to hire Intel Fellow Douglas Carmean, a key player in the design of several Intel microprocessors.



▲ Qubit diagram

cube
RECOMMENDED
SYSTEMS

BEST SELLING GTX960 SYSTEM

CUBE CYCLOPS



- MSI GTX 960
- Pentium K
- Windows 8.1
- 8GB DDR3
- 240GB SSD
- 2 Year Warranty

Only **£549**

BEST SELLING GTX970 SYSTEM

CUBE REAPER



- MSI GTX 970
- Core i5-4690K
- Windows 8.1
- 8GB DDR3
- 120GB SSD
- 1TB SSHD
- 2 Year Warranty

Only **£999**

BEST SELLING GTX980 SYSTEM

CUBE PHANTOM



- MSI GTX 970
- Core i5-4690K
- Windows 8.1
- 8GB DDR3
- 120GB SSD
- 1TB SSHD
- 2 Year Warranty

Only **£1649**



box
.co.uk

Buy online at
www.box.co.uk

Station Q operations are led by Dr Michael Freedman, a renowned mathematician who has won the prestigious Fields Medal (the highest honour available, as there's no Nobel prize for mathematics). It was Dr Freedman who approached top Microsoft executive Craig Mundie to convince him of the potential embodied in a new approach to quantum computing.

Mundie certainly knew this project would be a high-stakes gamble, with a payback measured in decades. A gamble based on as-yet unproven science (as we'll see later). Yet despite the risk, the potential opportunities it could open up were seen as so important that Mundie decided to fund this research anyway.

Topological Approach

The people housed in the Station Q building believe that a novel approach to the quantum computing problem is more likely to succeed – one that pushes the frontiers of our knowledge and what's physically possible.

The path Microsoft Research has decided to follow is known as 'topological quantum computing', and all those involved think it has the best chance of success.

The topological computing model was proposed in 2005 by the mathematician Michael Freedman and the physicists Chetan Nayak and Sankar Das Sarma. It involves precisely controlling the motion of pairs of subatomic particles, as they wind around one another, to simulate entangled quantum bits.

Anyons

In particular, Station Q is exploring a technique that's based on braiding exotic particles known as anyons (also described as 'quasiparticles' by physicists). Anyons only exist in two dimensions rather than

the usual three, and the group hopes to utilise this trait as the foundation of a supercomputer that can exploit the weird physical properties of subatomic particles.

Qubits can be constructed using ensembles of these particles that are precisely controlled inside exotic materials at extremely low temperatures – colder even than outer space.

Krysta Svore, one of station Q's leading researchers, has fronted a video (goo.gl/cdbY8y) that explains Microsoft's work on topological quantum computing.

High Risk

However, Microsoft's topological approach is perceived by scientists outside the Station Q environment as extremely high risk. In fact, even Krysta Svore admits the type of exotic anyon particle needed to generate qubits in a Microsoft designed topological quantum computer hasn't yet been definitively proved to exist!

That may change soon. Microsoft is heavily funding many of the academic research groups set up to explore a class of subatomic particles known as Majorana fermions (hypothesised by Ettore Majorana way back in 1937). Proving the existence of the Majorana would mean that it was likely they could be used to form qubits for this new form of quantum computing.

Microsoft supported research, led by the physicist Leo Kouwenhoven at the Kavli Institute of Nanoscience at the Delft University of Technology in the Netherlands, published research in 2012 that showed the strongest evidence yet that this long-predicted particle does indeed exist.

Researchers readily acknowledge that they've not yet even made a working prototype of the basic elements of their system. Even so, the Microsoft group is exploring what a prototype might look like should efforts to build anyon qubits succeed.

They've discovered that, if this type of qubit can be confirmed, it will have

a much higher resistance to errors than other kinds of qubit that are fashioned from electrons, photons and atomic nuclei. And it therefore offers a solution to the 'noise' problem, which is essentially the main focus of quantum computing research today.

Solving New Problems

For quite a long time, many thought quantum computers were useful only for factoring huge numbers. And there's no doubt organisations like the National Security Agency (NSA) are extremely interested in using quantum technology for code breaking and various surveillance data crunching purposes.

But now new algorithms for quantum machines have begun to emerge in areas involving large amounts of data, such as astrophysics or modelling new drugs.

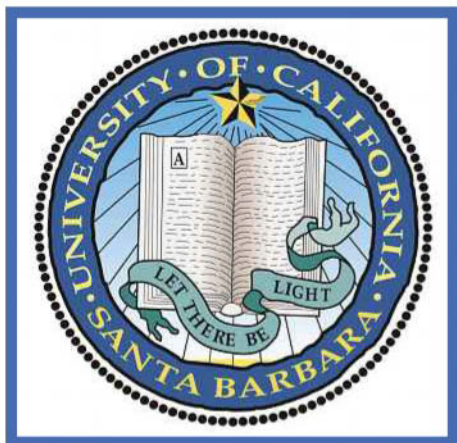
So for Microsoft, the whole point of its research into this revolutionary computing model is that it will take on the sort of fiendishly complex computational problems that are simply with today's Von Neuman architecture supercomputers.

In fact, many scientists now believe that quantum computers are best employed to tackle brand new kinds of problems, which have yet to be defined.

And what would Dr. Freedman do with a working quantum computer? Unsurprisingly for such a dedicated quantum scientist, he'd run a machine learning program to output an improved version of itself. [mm](#)

Links

Quantum project: goo.gl/NfjqrT
 Station Q: goo.gl/5YN5Qz
 Krysta Svore video: goo.gl/cdbY8y
 Quasiparticles: goo.gl/ciVQUy



▲ University of California, Santa Barbara



▲ Dr Michael Freedman



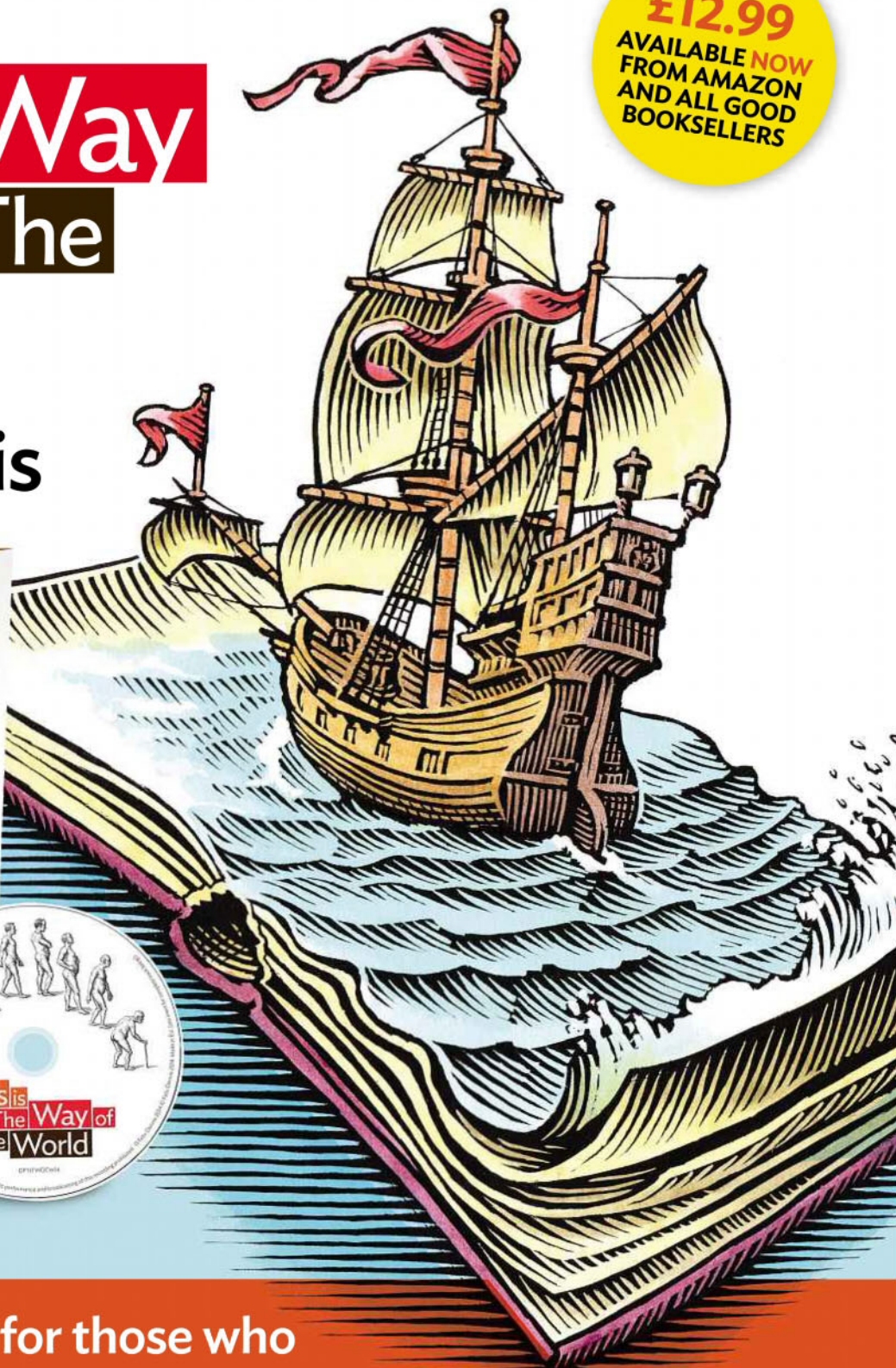
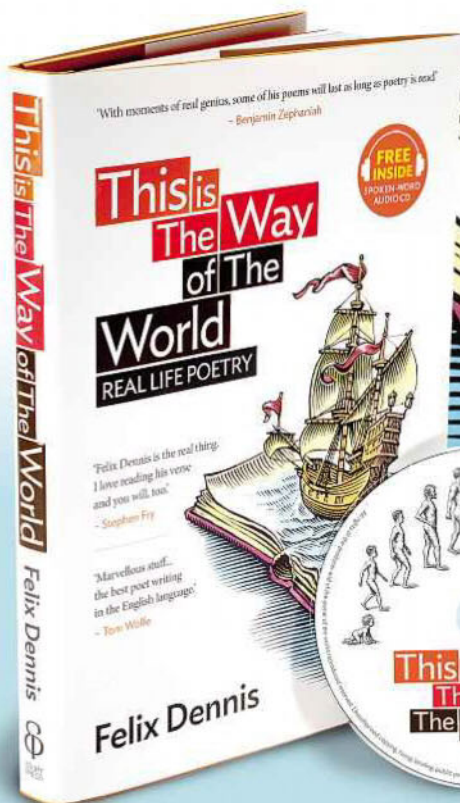
▲ Krysta Svore and David Rothschi

'With moments of real genius, some of his poems will last as long as poetry is read.'

– Benjamin Zephaniah

This is The Way of The World Felix Dennis

RRP
£12.99
AVAILABLE NOW
FROM AMAZON
AND ALL GOOD
BOOKSELLERS



**A book of poems for those who
don't read poetry** (as well as for those who do!)

A collection of 'real life' poems by Felix Dennis, one of Britain's best-loved poets, charting life's course from infant to endings with illustrations by Bill Sanderson.

www.felixdennis.com contains many poems, published and unpublished, as well as a library of sound recordings and video footage of Felix Dennis's verse and poetry tours.

Remembering... Maths Coprocessor

This week, we get a little help from a mathematician

Back in the early 80s the PC was essentially a business only machine. Gaming hadn't really taken off, and there would still be a few more years until the PC would become a recognised gaming platform, so the vast majority of PC-based computing was word processing, spreadsheets, design and CAD stuff.

The 80286, 80386 and 80386SX line of processors were the ones to get, the most powerful CPUs at that time. But they weren't particularly clever when it came to working out their sums, especially floating point arithmetic. Well, obviously they could do it, but the amount of strain on the processor when working out great chunks of mathematical data was pretty significant. CAD users, for example, who generated incredibly detailed plans and designs required a fair amount of processing power. While the 80286 and 80386 were the bee's knees, even they could stall when rendering the 3D designs for a house.

To speed things up, the maths coprocessor was developed – or in the case of Intel, the 8087 chip.

Its History

The coprocessor wasn't a new addition to the computer; in fact, it had been around for quite some time in early mainframes. For the desktop, though, it was relatively new, especially since sales of the desktop PC were beginning to pick up.

The 8087 boosted the floating point computations, addition, subtraction and square root calculations of the x86 main processor. Where the main CPU would take some time to dwell over the calculations and because it was processing everything else in the system as well, the time taken to push the finished result to the screen (as a rough example) wasn't really productive.

The maths coprocessor could take those calculations off the CPU and throw them back when it had finished working it all out. The result could be a system speed improvement of up to 500%, which for a room full of CAD workers designing an oil rig meant a far better return of investment to the company.

It wasn't just design, though, that enjoyed the extra processing powers of a coprocessor. Accounting software took advantage of it and even early gaming. From the point of view of gaming, a good example of coprocessor use would be the Super FX chip that was built into the cartridges of certain SNES games. *Super*

Mario World 2 and more notably *Starwing* could push their rendered polygons through the coprocessor to great effect.

The early PC gaming world also benefited from a maths coprocessor. There were numerous flight simulators, and *Descent*, *Screamer* and even *Quake* could use a coprocessor if one was installed in the system.

Unfortunately, the coprocessor came to an end when the newly released 486DX CPUs appeared. These were powerful enough processors that also included floating point functionality. However, the coprocessor, it seems, isn't quite as extinct as you may think.

The Intel Xeon Phi is the latest batch of coprocessors designed for use in supercomputing Many Integrated Core architecture. The Xeon Phi 7120A, for example, is a 1.2GHz coprocessor that can address up to 16GB of memory and has an eye-watering 61 cores.

Conclusion

To many, the maths coprocessor was the unsung hero of early computing. It helped with our work and it gave a helping hand to a handful of games. It was also quite the luxury item for the average user and gave an air of exclusivity to the person who had a 386 with coprocessor installed.

Perhaps it'll one day come back into desktop computing, maybe as a hot-swap card for the PC to add more computing power?

Did You Know?

- There were several coprocessors developed by Intel, AMD and Cyrix with clock speeds from 4MHz through to 10MHz.
- The CX4 was another NES coprocessor, used in *Mega Man X2*.
- The Atari STe, TT and Falcon all had FPU coprocessor sockets for the 68881 and 68882 maths coprocessors. Also available for the Amiga too.
- Falcon 3.0 used a maths coprocessor to render high fidelity graphics. It was a glorious thing to behold as well.



▲ An early 386 with Cyrix maths coprocessor installed



▲ An even earlier 286 with a coprocessor helping out



▲ A ULSI SX coprocessor – ingenious stuff

Component Watch

James Hunt looks for deals on a great AMD graphics card

Last week, we looked at how much you could find Nvidia's GeForce GTX 960 for if you shopped around. This time, we're looking its competition, AMD's own mid-price performance card, the AMD R9 280. Now a good 18 months old, has age cut its prices enough to impress you? We've got the cheapest deals around so you can make that decision.

Deal 1: Powercolor TurboDuo R9 280 OC
RRP: £174.99 / Deal Price: £149.99

This factory-overclocked version of the R9 280 comes with 3GB of GDDR5 and a GPU running at 855MHz, a full 27MHz faster than the reference board's 827MHz. Not a huge leap, but certainly nothing you'd turn down, and the dual-fan cooler with heatpipes goes a long way towards making that a better deal – especially when you can find it for less than £150.

Where to get it: Ebayer – bit.ly/1KAecIX

Deal 2: Sapphire AMD Radeon R9 280 DUAL-X
RRP: £187.34 / Deal Price: £151.94

The 850MHz clock on Sapphire's DUAL-X R9 280 might not be quite as fast as Powercolor's, but it's hard to deny the quality of Sapphire's brand helps make it a slightly more attractive prospect, which is reflected in a slightly less attractive price – although at this level, a difference of less than £2 is effectively invisible and you do get a higher discount!

Where to get it: CCL – bit.ly/1AuDoNT

Deal 3: Gigabyte R9 280 Windforce 3X
RRP: £169.99 / Deal Price: £157.42

The triple-fan design suggests that this iteration of the R9 280 means business, and it's tough to disagree. Factory overclocked to 950MHz, it isn't any faster than Sapphire's card on paper, but again you have to consider the Gigabyte name in the equation. If nothing else, three

fans are going to cause more noise and draw more power than two, but they also give bigger scope for overclocking the card yourself!

Where to get it: CCL – bit.ly/1LKBVE0

Deal 4: MSI R9 280X GAMING
RRP: £204.50 / Deal Price: £169.98

MSI's 280X Gaming Edition is targeted at high-end gamers, hence the high price, but you can find it at such huge discounts that it's hard to resist. The 280X edition has a default clock speed of 850MHz as found in most generic R9 280s, but it also has a faster memory clock and better floating point performance. If you're a keen gamer, this definitely makes a better buy than the standard R9 280. You'll see the results for yourself.

Where to get it: Ebayer – bit.ly/1P0mzEf

Deal 5: XFX HD 280X
RRP: £229.99 / Deal Price: £197.86

Billed as the 'Double Dissipation Black Edition', this card is close to the reference design but has reviewed very well, which explains why it has retained much of its already high price. The cooling is particularly efficient, hence its top billing, and as a result the card overclocks convincingly. If you're planning to run it at normal speed, it isn't necessarily worth paying extra for, but the overclocking overhead means it's worth thinking about if you're experienced enough to push it.

Where to get it: Dabs – bit.ly/1BpP3Is





YouTube App Causes Kerfuffle

Olloclip Launches New iPhone Lens

All-new Active Lens

Should you be an iPhone owner, you might also be a keen photographer.

If those two facts ring true, then Olloclip's new release may just be of interest. Its Active Lens will work on the iPhone 6 and 6 Plus on both its front- and rear-facing cameras, clipping on and off in seconds.

With the Active Lens, you can shoot further and wider with its Ultra-Wide lens, or switch to the Telephoto lens with a 2x optical zoom for

getting close to the action. Priced at £89.99, you can buy one of these lightweight, compact lenses from www.olloclip.com.



Google Patents Head-Turning Smart Toys

Beat that, Teddy Ruxpin

We remember first spotting Teddy Ruxpin at a friend's house in our younger years. Creepy doesn't begin to describe the feeling of watching that animatronic bear 'talking' to us.

Things could be about to get so much worse.

Google has reportedly got hold of a patent for devices – in the form of a rabbit or bear, according to images included in legal papers pertaining to be from the US Patent Office – that turn their heads to users while listening to what they're saying, before then sending

various commands to servers on how to respond. The patent is actually three years old and was spotted by a legal tech outfit, SmartUp.

It's not clear if Google will act on this idea. Patents are submitted by companies like Google all the time without any real consequence, but the idea of a Google-powered bear chatting to you or your kids while monitoring your everyday habits is a little off-putting, right?



Bad links lead to complaint

US regulator the Federal Trade Commission is looking over a complaint from a couple of child advocacy groups in relation to Google's YouTube Kids app.

The app has been found to link to videos deemed as inappropriate for youngsters to watch. YouTube has said that it will remove any such videos, saying in a statement widely circulated online that any flagged videos

are manually reviewed 24/7 and removed if necessary.

Google needs to deal with this, and quickly.



No matter what you're buying, it pays to shop around, particularly if you're going to be spending a lot of money. That's not a particularly radical thought, but it's still worth bearing in mind, even when something seems like a bargain.

As our look at technology outlet stores shows, just because a product seems to be reduced in price, it doesn't mean you can't find it cheaper elsewhere.

Since reading our article this week, I've been taking a look at what's available, and I've been impressed by some of the things I've found, like refurbished TVs and tablets. But it's also amazing just how many companies sell their refurbished stock for more than others sell the same things brand new. That's why it's so important to check that whatever price reductions you find aren't just based on retail prices that haven't been updated.

With a bit of care, though, you really can save yourself a bundle.

Until next time,

Anthony

Editor

Xara's New Web Designer

Throws in bunch of new features, naturally

Xara has released its Web Designer 11 Premium kit, proudly announcing a raft of new features to help users in creating state-of-the-art websites.

Contemporary styles can be achieved by adopting included features like full-width stretching backgrounds and new HTML5-supported animations while other stand-out tools include a flexible new widget for creating slideshows, and over 30 new website themes with up to 16 page layouts (all with mobile variants), plus text handling enhancements.

Syncing of files is another important aspect of this release, achieved via Google Drive and Dropbox, which means that multiple user edits will be updated for all. Furthermore, the beta version of **cloud.xara** gives an easy means of viewing, editing and updating on any computer or tablet.

Packaged with 2GB of free web hosting space, the Premium version of this can be bought for £69.99 from www.xara.com.



Meanwhile... On The Internet...

If you thought the recent IRS hack in the USA could be potentially embarrassing for those who have their financial details revealed to the world (tinyurl.com/MMnet65a), save a thought for the nigh-on four million souls affected by a massive hack on the infamous Adult Friend Finder site (tinyurl.com/MMnet65b) – a hack so comprehensive that it apparently afforded the perpetrators root access. While it's easy to scoff, attempt to claim some imaginary moral high-ground and claim that people using such a site brought it on themselves, none of us live our lives completely in the open – and we should all feel a little empathy for those having to deal with some extremely personal information (including fields concerning their sexual orientation and whether they were looking for an extra-marital relationship) being shared across the web in easily searchable spreadsheet form.

Once again, though, the whole affair calls in to question exactly what we're willing to share with the world online... And it reminds us that – even though we should without question be afforded it – we should probably not expect anything approaching privacy as standard if we chose to participate in such things.

What's especially galling about the whole affair is that, as Troy Hunt (the man responsible for first breaking the news of the hack) points out, within the 15 Excel files that were circulated first via Tor and then on the wider internet were details of deleted accounts as well as those still active (tinyurl.com/MMnet65c).

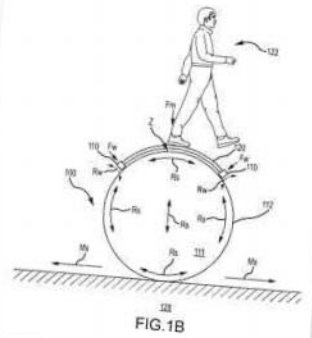
The biggest thing in social networking this year has probably been the rise to prominence of livestreaming, courtesy of the pioneers behind Meerkat and latterly the big guns backing Periscope, Twitter's take on the concept (tinyurl.com/MMnet65d). So the fact that the latter has significantly expanded its user base by releasing an Android-friendly app is de facto A Big Thing.

We've covered some of the issues with Periscope-type technology, not least its potential for mass copyright infringement, but it would appear that the genie is out of the bottle now, and it's going to be a hell of a job getting it back in again. Whether or not it all turns out to be the TV industry's equivalent of Napster remains to be seen.

Followers of the @micro_mart Twitter account are probably aware of John's affection for BB-8, the new droid that has featured heavily in the long-haul promotion campaign for the upcoming Star Wars revival. Indeed, his shock at seeing that the little ball of tech was a real, working prop was announced in a particularly of topic series of updates while watching the live stream from Celebration

Anaheim when he probably should have been doing what he's paid to do. Anyway... He's especially excited with the news that toy/tech company Sphero is planning to release a consumer version of BB-8 in the near future, for which he's already queuing (probably), and would also like to point us all in the direction of an enterprising group of fans who appear to have made it their task in life to fully explain how the little fella works (www.howw8works.com).

The aptly titled howw8works.com points to a patent for a "Magnetic spherical balancing robot drive" (US 8269447 B2, for the record: tinyurl.com/MMnet65e) created by Lanny Smoot and Dirk Smelling for Disney Enterprises, Inc., which appears to pretty accurately describe the operation of the droid's body (basically, imagine a Segway inside a ball – apparently an expansion of a concept known as holonimics) and give scope for the particularly impressive and apparently magnetically controlled head to operate. What's especially interesting is that the patent, which apparently came from staff within Disney's Imagineering team, dates back to 2010. That means that either Disney had been working on the whole Star Wars project for a lot longer than the deal with Lucasfilm would hint or its staff had been taking inspiration from legendary concept artist Ralph McQuarrie and were then presented with the perfect opportunity to realise his vision. Either way, good on 'em, and good on web designer Carlos Sánchez (@chocotuits) and 3D CG whizz Emilio Gelardo (aka EGPIET3D) for their work digging up the details and creating the site. Here's hoping their dream of building their own Astromech becomes a reality.



We've reported many times on the SWATting phenomenon that has blighted high-profile users of Twitch over the last year or so. For those not familiar, it's essentially an offshoot of Doxing, whereby an individual gains knowledge of an address for someone streaming their gameplay and then phones in a false report to police that causes armed police officers to raid said address – a invariably surprising, dangerous and tense event that is then streamed live over the internet. It's not big... and it's definitely not clever.

Thus, the news that a 17-year-old Canadian has pleaded guilty to a series of such endeavours is particularly pleasing news (tinyurl.com/MMnet65f). In fact, the teen, who unfortunately can't be named, has admitted responsibility for 23 such crimes, which were mainly aimed at female gamers who didn't respond to him via social media, but also included bomb hoaxes targeted at Disneyland. In an understatement of epic proportions, reports also informed us that one of this nasty little piece of work's chosen online handles was – wait for it – 'Obnoxious'. Wow... All that and self-aware too.

Aaaaaaaand Finally...

Are you a *Lord Of The Rings* fan? Ever wondered exactly how far Sam and Frodo actually walked? No... Neither have we. Yet... tinyurl.com/MMnet65g

.AVWhy?

Videos For Your Eyes...
Not Necessarily For Your Brain

We're going to miss the viral beauties that come from John Stewart when he backs away from The Daily Show. His humour has become somewhat ubiquitous over our internets in recent years, and this rant over the FIFA corruption is a perfect example (tinyurl.com/MMnet65h). Of course, the issue is well worn territory previously mined by the UK's own John Oliver on his HBO show to equally funny/not funny effect (tinyurl.com/MMnet65k).

Caption Competition



What's this chap up to? Let's see what you made of it:

- Think TankFor: "Mash get smash."
- JayCeeDee: "Do you really mean 'Hit any key to continue'?!"
- doctoryorkie: "Official Redmond Safety advice for Windows 8 users."
- wyliecoyoteuk: "Testing was well under way for the new carpentry simulator."
- shuggie: "Looks like a Basil Fawlty moment."
- The VFM Addict: "The advice clearly stated that if locked out of one's car, one may need to smash windows to gain entry."
- old timer: "Been there, done that, even wrapped it in the T-shirt, and it still will not boot."
- Steveskeggy: "Quentin Tarantino watches the Monaco Grand Prix on Sky Go player..."
- Thomas Turnbull: "This should fix those security holes in XP."
- Thomas Turnbull: "Me and my laptop are heading for a break up."
- Thomas Turnbull: "It's hammer time."
- Gary Mann: "A slight technical adjustment was required."
- "The Windows fragmenting tool."
- "Hello world? Say 'hello' to my little friend!"

The winner this week is JayCeeDee, who suggested "Downloading Whack-a-mole wasn't among Ted's smarter ideas."

To enter this week, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk) and say something funny (but not too rude) about the picture below or email us via caption@micromart.co.uk.



Web Sell-Off From UK

Government lets addresses go

A large batch of IPv4web addresses that are no longer being used by the government have been sold off.

Norwegian firm Altibox has, according to the BBC, purchased

the addresses for £600,000. This sell-off is part of getting rid of 16 million addresses handed to the Department of Work and Pensions in the 90s, and this could all ultimately mean £15m for the government as a result.

Rockstar Sued Over BBC Drama

GTA Game Changer programme under fire

The chaps behind the *Grand Theft Auto* series, Rockstar Games, are suing the BBC over its planned drama, *Game Changer*.

Game Changer will star Harry Potter actor Daniel Radcliffe, who will be playing Sam Houser, one of the co-founders of the gaming company. The programme will

reportedly centre on the legal battle between Rockstar and US lawyer Jack Thompson who was a strong opponent of violence in video games.

As for Rockstar's issue with the drama, that apparently centres around it wanting to ensure that its trademarks are not "misused". Will this action stop the programme airing?

Snippets!

Correction

In our group test of micro PCs (issue 1363), the price of the Gigabyte Brix S GB-BXi5H-5200 was stated as "from £190". In fact, it should have said "from £420", and the model reviewed cost £639.

Pac-Man Reaches 35!

A belated happy birthday to the big man who loves his pills. Yep, Pac-Man is 35 this year and to recognise the fact Sony Pictures sent him to space. A model of the classic character was sent up via helium balloon with a GoPro camera attached to record its progress.

Naturally, Sony had something to promote in doing this, namely its upcoming movie nod to gaming, Pixels.

Whatever the reason, it's always nice to have a reason to remind ourselves of the yellow fellow. See the footage for yourself on YouTube – Pac-Man Space Launch should do it.

Nintendo Bags Bowser

Nintendo of America has hired Doug Bowser to head up sales.

The significance of the new executive's name wasn't lost on those putting together the press release on his appointment, noting that he had "a name that's well-known in the Mushroom Kingdom... Doug Bowser (no relation to the King Koopa and Mario's longtime nemesis) will oversee a variety of sales-related functions..."

No word on whether a Mr or Mrs Toad will be heading up the finance division.

Android Flaw Leaves Data Vulnerable



Experts warn over factory reset

If you're unlucky enough to have your Android mobile device stolen, you may feel some degree of comfort in the fact that you can remotely wipe a phone. Similarly, the chance to restore a phone to factory settings before handing it over to someone should make you feel your data is safe, right?

Think again.

Security experts from Cambridge University have discovered a flaw in the factory reset option, which could leave data behind for snoopers. Researchers

bought 21 used Android handsets for their experiment to see what data remained, and in some cases, they managed to retrieve files allowing access to a Gmail account.

Ultimately, they claim their research proves that data might still be accessible despite a factory reset, with every phone in the experiment leaving something behind after a reset. The upshot is that the researchers estimate up to 500 million devices may be affected by the data wipe issue.

Ouch.

Wii Burns Down Home?

Owner lays blame at Nintendo's door

To America we now go, as news of a fire at an RV in Colorado Springs made the headlines across the pond.

The owner of the RV involved has reportedly said that the fire emanated from his Nintendo Wii, with firefighters apparently stating that all smoking and other sources of fire had been ruled out, so they were almost certain that the only possible cause left was the Wii console.

According to news reports, the owner said that he was watching Netflix before turning the console off and leaving his RV home with the console still plugged into the mains socket. By the time he returned, disaster had struck.

There was another recent console fire story, here in the UK. An overheated console (we don't know which one) was to blame for a house fire in Biggleswade after it was covered by clothes.

Youngster Amasses £3,000 Google Play Bill

Yikes

Imagine the horror at discovering that your 11-year-old son had spent £3,000 of your money on purchasing credits for his favourite mobile apps. Doesn't bear thinking about really, does it?

For the mother of Nick Wrinch, that nightmare became a reality, and the story soon became national press news.

Media reports stated that Nick used the Google Play store to buy apps and credits for his

favourite games, using the debit card details his mum trusted him with while playing the tablet. Did Nick go crazy and buy everything he could? Actually, no. He was trying to buy credits for various apps, the process failing for some reason, and the credits didn't appear on the family tablet.

Over a two-month time period, £3,000 was paid out to Google Play, and the parents were quoted in The Guardian as being upset that Google didn't have any processes in place to

stop people endlessly clicking while the money kept going out.

By all accounts, after initially refusing to help, Google has since decided to hand a refund over to the family. As for anyone else reading this who might be a wee bit worried about a similar thing happening to them, two words: password protection.



iOS 9 Optimised For Older Devices?

iPhone 4S feeling the love

It's no secret that owners of Apple's older devices, such as the iPhone 4S, are often left feeling short-changed when it comes to new iOS releases.

Apple is clearly all too aware of this, with a report at 9to5Mac claiming that the next iteration of iOS (that would be iOS9) will turn its gaze to supporting legacy devices. By all accounts, the firm has restructured its

software engineering process to support older hardware, with particular attention to the iPhone 4S and original iPad Mini.

If this is true, owners of the iPhone 4Ss in particular should be pleased. Battery life and all manner of performance issues have been affected as the operation system has developed over the years. Perhaps it's not yet time to trade up.

Premium Phone Charges Change

About time

Rejoice, for the cost of premium phone lines is changing.

From the beginning of July, phone numbers beginning with 08, 09 or 118 will change, as the cost of calling one of these numbers will be split into two: an access fee and a service fee. The access fee will be set by the network provider, while the service fee will come from the company

being called. The idea behind doing this is that more transparency could, in theory, mean lower call costs.

The change has been called for for some time, as people have long complained about the confusing costs levied by premium phone lines, and this is part of a wider change in the phone market, which will include free calls to 0800, 0808 and 116 numbers from this month.

Fuze Basic Reaches Raspberry Pi

V3 free for users

The maker of Fuze Basic is only too happy to tell you that it's made version 3 of its computer package available for Raspberry Pi owners.

Downloadable for free from www.fuze.co.uk for all models of the Raspberry Pi, Fuze Basic is a modernised version of the BASIC programming language, with a redesigned UI and advanced graphics support. Capable of

programming tablet and iOS-styled games, Fuze Basic is designed to introduce text-based programming to users in an accessible manner and Fuze Technologies has also included a 90-page Project Workbook within the download, providing everything users need to know for projects such as electronic circuit control, plus a comprehensive guide to getting started with the programming tool.



MSI AP16 Flex

A smaller AIO than usual but one that's at the heart of your connected lifestyle

DETAILS

- Price: ~£349
- Manufacturer: MSI
- Website: goo.gl/7e4T7B

At 15.6 inches, the MSI AP16 Flex is smaller than the other all-in-one touchscreen devices that MSI offers. Indeed, it's not far off from being a tablet, albeit one that's slightly heavier than usual. This makes it quite a versatile touchscreen PC, as there are more situations where it can come in handy compared to the far bigger 22"-plus panels.

Inside you'll find a reasonably fast quad-core Intel Celeron J1900 2GHz processor, with a burst frequency of up to 2.42GHz, 4GB of DDR3L SO-DIMM memory and a 500GB, with a copy of Windows 8.1.

Furthermore, the ten-point touch Flex 15.6" LED backlit panel has a maximum resolution of 1366 x 768, and on the right-hand side of the screen there's a 3-in-1 card reader, USB 3.0 port with supercharge, 3.5mm audio out, and a single USB 2.0 port. Around the back of the panel, in a recessed area, there are



▲ The MSI AP16 Flex is an interesting touchscreen that's well priced, and reasonably powerful

two more USB 2.0 ports and a gigabit Ethernet port.

There's also wi-fi 802.11 b/g/n, Bluetooth, a 1MP webcam and a pair of 2W speakers. The Flex also supports Intel Ready Mode, whereby it will still sync files or stream media from the network while in a standby, low power mode.

The AP16 Flex has a couple of upgrade options too: you can boost the amount of memory to 8GB or opt for a 32 or 64GB eMMC flash storage. Suffice to say, it can be given a significant performance boost should you decide to pay for it.

The design of the Flex is quite good, overall. It's a

little too heavy to be used as a tablet, but the kickstand can be extended to just over 90°, and it comes with an AIO VESA mount kit, so it could essentially be mounted under a kitchen cabinet, due to the auto-orientation of the screen.

The bezel is a glossy black, backed with a gun-metal grey plastic. Oddly, MSI decided to place the power cable on the right-hand side of the screen, so when it's wall mounted, the cable is difficult to disguise. However, while it may not win any design awards, the Flex is a perfectly usable and responsive touchscreen Windows 8.1 PC.

All the usual, day-to-day tasks you would expect from an AIO were handled well enough. Streaming content from one source or another across the network to it worked well, as did reading a list of ingredients from the screen in a brightly lit kitchen.

We can see a use for this in the modern home, as a TV or media device for the kitchen, garage or work shed. It'll even



▲ There's lots of potential uses for the Flex in the home

have a use as an intercoms device, a controller for home automation or simply as a smaller Skype unit. Simply put, it's a handy smaller screen with plenty of potential and enough performance to keep up with your needs.

There are a couple of areas of the design that could do with being improved, such as the power point placement and the fact the power and volume buttons along the top of the screen felt a little weak. For around £349, though, the MSI AP16 Flex is certainly worth checking out.

mm David Hayward

Features

- Windows 8.1.
- 3 in 1 situation mode support: stand mode, hanging mode, flat mode.
- Intel Celeron® Processor J1900.
- Fan-less design.
- Touch panel with ten-point multi-touch support.
- MSI Super Charger for high-speed data transfers and fast charging.
- Intel Ready mode support.

Ideal for the modern connected home



D-Link mydlink Home Smart Plug

D-Link arrives in force at the home automation party

DETAILS

- Price: £43.49
- Manufacturer: D-Link
- Website: www.dlink.com/uk/en
- Required spec: Wireless router (802.11n) with an internet connection, an available power outlet, Apple iPhone or iPad or Android smartphone or tablet



A short while ago, I covered some Belkin smart devices for Micro Mart, and I'm now lucky enough to have received some D-Link ones to make a comparison.

The DSP-W215 is exactly the sort of thing that most people think about when the phrase 'home automation' is used, as it's the simplest level of control that you can extend to any of your appliances.

Looking a little like many of the smaller Powerline adapters, the Smart Plug is designed to be placed between the wall socket and the device you'd like to remotely control. Once powered, you can connect the box to your wi-fi, which provides a means to link it to the internet and a mydlink account. That last bit is critical,

because without that centralised control, you'd only be able to turn power on and off locally, whereas with this gizmo you can do it from any internet connected point on the globe.

But that's probably the least impressive thing you can do, because like the Belkin

The only problem I encountered was that for some curious reason, I had difficulty setting it up with my Motorola phone, though my Nexus 10 tablet worked immediately. Other than that, it works pretty much as D-Link promotes.

As I see it, there are two problems with this device that undermine it a little. The first is undoubtedly the price, which is just too high when compared with a simple power timer. This might do so much more, but remote lighting control is what many people will use it for. And the other is that to truly get the full benefit of this, you need some other D-Link devices, like its motion sensor, so you can build a more sophisticated response to activity around your home.

I like what D-Link has done; I'm just concerned that at this price people just won't buy into it as readily as they might have done if it were cheaper.

mm Mark Pickavance

“ To truly get the full benefit of this, you need some other D-Link devices ”

equivalent, you can use the smartphone application to control it and even connect when it operates to other D-Link devices.

As a fringe benefit, you can also monitor how much power is flowing through it and the operating temperature, which could be useful if you're concerned about a potentially problematic appliance drawing high power while you're away.

Another nice touch is that should someone decide to push the button on the Smart Plug to power it off, you're made aware on your phone or tablet that they've overridden the control locally.

The installation sequence is cleverly streamlined by the smartphone app being able to read QR codes that the device and its paperwork have, which uniquely identify it for linking. Perhaps a NFC tag might have been even slicker, but the chosen solution works with every phone or tablet with a working camera.

One obvious improvement would be that from the eu.mydlink.com website, you should be able to have the same control as the smartphone app offers, other than just showing you what devices you have installed.

An expensive remote control power socket



Acer Chromebook 15 C910

Acer's adds a chubster to its burgeoning Chromebook range

DETAILS

- Price: £229
- Manufacturer: Acer
- Website: www.acer.co.uk
- Required spec: Google account, internet access via wi-fi

The number of Chromebooks available is increasing rapidly, though many of them are just too small for me to use on a regular basis. For those who crave a bigger keyboard and screen, Acer has now released the C910, a Chromebook for the distinctly harder working Chrome OS fan.

Picking the C910 up for the first time, you'd be easily forgiven for thinking it was a low-cost PC running Windows. And given the technical specification, that option probably isn't as implausible as it would be with other Chromebook designs.

The C910 is built around the Broadwell dual-core Intel Celeron 3205U 1.5GHz and comes with 4GB of RAM and 16GB of SSD storage. That might seem a modest amount for local file storage, but Chrome OS is primarily a cloud environment, where your documents are centrally secured online.

However, the biggest selling point for me was the

15.6" screen, big enough for document work even if it's only a 1366 x 768 resolution on this version.

However, the downside of all this powerful and useful gear is that this is also the heaviest Chromebook I've reviewed, at a hefty 2.19kg.

That's a mild disappointment, even if Acer did exceed my expectations by including 802.11ac wi-fi, a webcam and enough battery capacity to deliver a realistic nine-hours of use.

Where this design is a revelation is in the performance available, because as Chromebooks go, this one seemed rocket assisted compared with others. Web content is painted rapidly and smoothly, YouTube streams cleanly, and moving between apps is all but instantaneous. As a Chrome device, it's a dream.

While the trackpad on the C910 is fine and large, adding a mouse through one of the included USB ports can turn this into a much more fluid experience, especially if you're required to tag multiple files or organise contents.

For those with a monitor handy, it's possible to hook it up through HDMI and work at a higher resolution or even use multi-display mode.

Features like this underline how the Chrome OS is now maturing and how you can use it to do many of the things

you'd normally associate with a Windows PC. That said, there are some places that even the C910 falls down, specifically playing certain video file formats and editing large video files or still images. These are domains where a Windows PC is still king.

The C910 is also devoid of any upgrade potential, with the single exception of an SD card slot. While I understand the idea of additional storage is at odds with Chrome OS, allowing owners to make some enhancements would make this

hardware seem distinctly more like a PC.

A more curious choice Acer made was the texture that it placed on the casing, which I assume was meant to look like carbon fibre. It does briefly, when you first unpack the machine, but not long after it becomes a haven for dust and marks that soon make it look rather abused.

Along with the weight and texturing, the other disappointment of the C910 is the keyboard. Given the amount of space available, it



Specifications

- Intel Celeron dual-core processor 3205U (1.5 GHz).
- 4 GB DDR3L SDRAM.
- 16 GB solid-state drive.
- 15.6" HD Screen, Intel HD Graphics.
- Up to nine-hour battery life.



seems unnecessarily cramped, isn't backlit, and it doesn't have the positive key travel needed for rapid typing. Although adaption to it may be possible, I didn't immediately warm to that critical part of the design.

But the bigger issue here is that the larger screen and increased computing power has a cost, and one that elevates the C910 into the same space as some of the cheaper Windows PCs. For another £70, you can get machines like the Lenovo G50-70, which offers a Core i3 CPU, Windows 8.1 and

500GB of internal storage. You can still run Chrome on these, but they also have access to the Windows ecosystem, critically.

Where the C910 wins out is that the machine will go a working day on a single battery charge, and switching from it to your next Chromebook only requires you to input your Google account information and password.

That last point is the distinct advantage that Chromebooks, and the C910 in particular, has successfully gained for itself, because while Microsoft is

making strides towards cloud-based account transfers, it will never be as elegant as it can be under Android or Chrome OS.

What Acer needs to do is work on shedding half a kilogram or more off the C910, make a superior keyboard and find a better way to detail the surface, and it'll have a winner.

For those who just want a decent platform for Chrome, at this price the C910 is a major notch up from the Atom-based notebooks and easily worth what Acer is asking for it.

mm Mark Pickavance

A big Chromebook with excellent performance



i-Rocks Rock Series K10 USB Gaming Keyboard

A no-nonsense keyboard for those who want quality and durability

DETAILS

- Price: ~£20
- Manufacturer: i-Rocks
- Website: goo.gl/7uVmCv
- Required spec: Spare USB port, OS independent



■ i-Rocks may sound like a relatively new company in the technology arena, but it has been in operation for at least 13 years, producing computer peripherals. With this experience behind it, the company is now introducing more affordable and interesting products to the peripheral market, in particular gaming products.

The i-Rocks Rock Series K10 USB Gaming Keyboard is one such peripheral. This keyboard has a lot going for it, such as 30-key anti-ghosting, a 100Hz polling rate, Windows key locks, 180cm cable length and a solid 1.2kg base that can take some punishment.

The key switches are constructed from polyoxymethylene (POM), also known as Delrin, which

is an abrasion resistant, low-friction plastic that provides a tough and durable switch onto which the PBT constructed keycaps are fitted. However, this isn't a mechanical keyboard, interestingly; it's just a membrane, but thanks to some clever design and construction, the K10 actually feels more like a keyboard with Cherry MX Red switches.

Call us old fashioned, but it's how a keyboard feels when in use that proves its worth. We've tested many mechanical and membrane keyboards and everything else in between over the years, and while a mechanical keyboard still remains the holy grail of keyboards, the K10 has proved that there's still

something to offer from the membrane design.

There's a good tactile feel to the keyboard; it's also responsive, and your fingers flow over the key layout with ease too. The weight of the keyboard, as we mentioned, is heavy enough to stay put on a desk and to take the brunt of some keyboard mashing games and plenty of word processing without any feeling of it becoming too flimsy over time. There's a high degree of quality here, that you can, again, feel from the moment you start to use it.

The layout of the K10 is simple. There are no extra macro keys to clutter up your view of the keyboard, and illumination is limited to just the Numlock, Caps Lock, Scroll lock and the aforementioned Windows Key lock LEDs. Optionally, the i-Rocks logo on the spacebar can be illuminated by pressing the **PrtSc** key for a few seconds.

Of course, this does mean it lacks some of the more desirable features of a professional gaming keyboard. The umpteen macro key selections, the individually illuminated key caps, the

additional multimedia keys and the ability to plug in a headset directly to the keyboard or a USB device, for example, could leave gamers regarding this as more of a working keyboard rather than one that can be taken seriously in the gaming world. Realistically, i-Rocks could do away with the Gaming part of the title, since there's little in the way of gaming enhancements, and instead opt for selling it as it is: a high quality keyboard.

That said, this is a keyboard that can be picked up for less than £20; £19.46 was the lowest we found one for online. So if you're after a more cost effective, durable and less flashy keyboard, then the i-Rocks K10 is certainly one you should seriously try out.

On the whole, the i-Rocks Rock Series K10 USB Gaming Keyboard is a great and well-priced peripheral. As we've already said, it feels good to use and it performs magnificently. What it lacks in bells and whistles, it more than makes up for in design quality and engineering.

mm David Hayward

A great keyboard, at an exceptional price

Specifications

Interface: Full speed USB.

Polling Rate: 1000Hz.

Key Number: 104 keys (by language).

Key Stroke: 3.8±0.5mm.

Key Force: 55±15g.

Switch Life: about 20 million life cycles.

Cable Length: 180cm.

Dimensions: 448 (L) x 148 (W) x 34(H) mm.

Product Weight: about 1.2kg.

N-key Rollover with 30-key trigger capability.

Membrane key-switches with plunged key structure.



Sennheiser Urbanite XL Wireless

With the freedom to walk around untethered, Michael Fereday has been testing a Sennheiser headset

DETAILS

- Price: £249.99
- Manufacturer: Sennheiser
- Website: www.sennheiser.com
- Required spec: n.a.

The Urbanite XL Wireless product is a Bluetooth on-the-ear type headset from Sennheiser. This particular model is a collapsible headset, which comes packaged with a standard micro-USB lead for battery charging, an audio lead with built-in remote and microphone plus a draw-string soft cloth carry case for transporting the headset when not in use.

As you would expect with Sennheiser, some effort has gone into the design of this product. The unit's headband is made up of a sturdy material stitched onto an off-white compressed rubber layer that sits on the head. When necessary, you can extend this headband by up to 3cm at each end using aluminium sliders, while the earpieces have a degree of flexibility to ensure a better fit for different head sizes and shapes.

My initial impression of the headband was that it did not look too comfortable, but impressions can be deceptive. Even for lengthy listening sessions, I found this headset, with its well-padded earpieces, was very comfortable. However, it did have a tendency to slide a little if I made the mistake of inclining my head forward for any reason.

Having mentioned that the earpieces are well padded, I should point out that they also contain other features. On



the outside of each earpiece there's a touch sensitive panel providing access to different features. The panel on the left allows you to adjust volume level, track cycling and phone call options depending on whether a swipe, single tap, double tap or a combination action is implemented. I found it took a good deal of practise before I felt confident of achieving the desired action at the first attempt.

The functionality of the touch panel on the right earpiece was far easier to master. It's just used for NFC (near field communication) connectivity to establish a Bluetooth pairing with support for the latest 4.0 version of the technology. A three-way

switch on the left earpiece can also be used to establish a Bluetooth connection. Up to eight different Bluetooth pairings can be stored.

While the headset's internal lithium battery is rated at 25 hours of wireless use, there's always the possibility that you might forget to recharge it, leaving you with a dead battery. In such circumstances, you can use the provided audio lead to connect to your smartphone or tablet. It's not immediately obvious, but the jack plugs at each end of this lead are of a different size. The L-shaped jack plug is of the 3.5mm variety and is used for attaching to the mobile device, while the straight

jack plug is 2.5mm and links to the headset.

While you do have a choice of attaching this audio lead to an appropriate socket on the left or right earpiece, the make-up of the lead and the one-way connection arrangement does mean that the remote feature is positioned close to the earpiece. This is necessary to ensure that the microphone is near enough to the mouth to pick up sound. However, it does mean that accessing the functionality of the remote will need to be carried out by touch alone. Some could find this to be rather fiddly.

mm Michael Fereday

A well-designed headset with touch sensitive controls



The Witcher 3: Wild Hunt

Into a land of magic, war and terror we ride. Mouse and keyboard in hand

DETAILS

- Price: £49.99
- Manufacturer: CD Projekt Red
- Website: goo.gl/x3a5jF
- Required spec: Windows 7 or later, Core i5 3.3GHz, 6GB RAM, GeForce GTX660/Radeon HD7870, 40GB disk space

Polish developer CD Projekt Red has had extraordinary success with the *Witcher* series. Since the release of the first title in the series, in 2007, the core game has matured and evolved into something rather epic. But does *The Witcher 3: Wild Hunt* have what it takes to be the best open world RPG ever released or is it just a passing fad?

As with the previous titles, you take on the role of Geralt of Rivia, hard as nails swordsman, monster slayer extraordinaire, and gruffly voiced rogue. The plot follows Geralt as he roams around the lush and mind-bogglingly huge land of Temeria, deep in conflict from warring nations, searching for his once ward, the youthful Ciri.

Ciri, as it happens, is also the daughter of the Emperor of Nifgaard and the one who has sent you on this quest. However, for reasons we won't get into here, Ciri is being pursued by the ethereal and other worldly Wild Hunt.

The main storyline is a splendid work of fantasy, told through individual missions and reinforced through the various cut-scenes and visually impressive locations. But within the expanse of territory you have to cover, you'll find countless other sub-missions and Witcher contracts that help level Geralt up, while



▲ The land, villages, towns and cities you come across are gloriously defined

also offering you some much needed coin and the chance of looting some better armour, weapons, crafting materials and alchemy ingredients.

It's these sub-missions that make the game; you'll be following the main story one

cutthroats to the business end of your sword.

It's difficult to get across just how magnificent the world that Geralt inhabits looks from our end of the monitor. True enough, it's a bleak and harsh environment, war-torn and

The result is a world that can either make you or break you. The choices you make as you take on various contracts and missions will affect those around you. Villagers will either praise you or spit on the ground as you pass them by. The latter can make things more difficult if you want information, and casting a quick Axii spell to befuddle their minds and force them to dish the dirt won't win you any allies either. So there's a level of caution needed. At times you'll have to be the hard-faced, sword-wielding lunatic, especially when faced with a company of armed individuals; at other times, though, diplomacy and even a spot of heartfelt emotion goes a long way.

Naturally, you have an arsenal of weaponry at your disposal. The two main weapons of choice are a steel sword, for dealing damage to non-monster opponents, and a silver sword, which will harm the supernatural. Alongside your swords, you'll eventually be handed a crossbow, which can be upgraded with more powerful bolts. And then

“ The Witcher 3 is one of the most splendid game we've ever played ”

minute, when you'll suddenly come across a weeping maiden at a crossroads, who has a story of woe to tell you. On agreeing to help her, you'll be thrown into an equally incredible work of fantasy, as you clear an abandoned village of a particularly nasty spectre or hunt down a werewolf. The goal of each mission differs slightly, but the result is money in your pocket, more ability points to spend on upgrading yourself and the self-satisfaction of having introduced a vile band of

often littered with the corpses of the fallen. There's immense poverty, sadness and the inevitable evil that humans can subject one another to when living in a lawless world. Behind it all there's still the political shenanigans of the rich and powerful, as they manoeuvre themselves like pieces on a chess board for a better advantage. In an almost *Game of Thrones* way, you're drawn into their machinations but from the point of view of the sword for hire.



▲ With every breathtaking landscape, there's the depths that humanity can sink to



▲ Never mind society, especially when there are griffins to hunt down

you have your Witcher Signs, one-handed spells that are quick to cast but which can change your fortune in battle.

There's more, though; on top of his magical abilities, Geralt can concoct a pharmacy's worth of potions and other elements using the many plants and monster body parts he comes across. The potions, like the Signs, have the ability to turn a

battle in your favour. Some will endow you with more fighting prowess; others will stave off the effects of magic. But for each potion consumed there comes a price. Your toxicity levels will rise, and if they're too high, then you'll start losing health, negating the positive effects of the mixed ingredients.

Graphically, *The Witcher 3* is one of the most splendid

game we've ever played. Riding into a decimated village, with the sun setting in the distance, is a thing to behold. Likewise, striding through the busy and bustling streets of Novigrad is simply jaw-dropping. If you thought standing on a hill and watching the sun rise in *Skyrim* was breathtaking, then *Witcher 3* will have you in tears.

There are countless other elements to the game that we could wax lyrical about. The mini-game of Gwent, for example, is an odd card game that pops up as a sub-mission within a sub-mission from time to time. Equally, you'll get moments where you have to chase down a rider on horseback. Combined, they all fuse into the glorious spectacle that is the world of monsters, swords, battles and witchcraft. In saying that, though, there are times of repeated looting, hunting and foraging. Often you'll find yourself going through the motions in an RPG grind that most open-world games suffer from. To be fair, though, when you come to that, it's time to hit the main storyline again and refresh the environment.

So in answer to the original question, yes, *The Witcher 3: Wild Hunt* is the best open world RPG ever. There are tens of hours' worth of gaming content here and more on the way in future months. CD Projekt Red has raised the bar, which all other RPGs will now be measured by. To even come close is going to take some doing.

mm David Hayward

Will keep you enthralled for months to come



GROUP TEST

Micro Servers

Last week, we looked at the more traditional tower server, and this time, we thought we'd miniaturise everything and see what micro servers are available.

David Hayward takes six in hand and sees if there's more to these tiny powerhouses than first meets the eye.

Micro Servers

HP ProLiant Gen8 MicroServer G1610T

DETAILS

- Price: £180
- Manufacturer: HP
- Website: goo.gl/GDCCof
- Required spec: OS for server functions, some cases you'll need hard drives



The HP MicroServer brand has been around since early 2012. In the beginning it didn't have

much respect. After all, what's the point of having a lesser powered, low specification server? However, it has managed to prove itself among its peers and has grown quite the fan base.

The HP ProLiant Gen8 MicroServer G1610T is directed towards the small business or home office user who's looking to set up their first dedicated server, for whatever resources they wish to serve to the network. Therefore it's not going to be as all-powerful as the huge, humming monolithic towers that occupy corporate server rooms.

The specifications are modest, with an Intel Celeron G1610T dual-core 2.3GHz CPU, 2GB memory as standard and, in our case at least, a single 500GB hard drive which

▲ *A good NAS may prove to be more powerful in the long run*

is OS free – we installed Ubuntu Server 14.04.2 LTS for testing purposes.

The MicroServer chassis measures 229 x 245 x 232mm and weighs roughly 6.5kg. On it you'll find a pair of USB 3.0 ports, five USB 2.0 ports, an internal micro-SD slot, a pair of gigabit Ethernet ports, VGA and an iLO 4 port.

The iLO 4 port isn't something most average users come across on their standard desktops. Basically, it's an Ethernet port that offers remote control and management. The iLO 4 connection (which incidentally stands for Integrated Lights-Out) is its own separate network connection, with a different MAC address, IP address and so on, and it can be communicated with via the HP iLO Management Engine and Software.

There's a single PCIe x8 slot if you want to add a more powerful GPU, and you can expand the amount of memory up to 16GB and add up to four SATA drives with RAID support of 0, 1 and 10 to the embedded Dynamic Smart Array. Beyond that, there's little else that needs adding other than a suitable OS.

Although a good little server and at its lowest possible specification reasonably cheap

(costing in the region of £180), you have to argue that when compared to a modern NAS setup, the HP MicroServer is looking a little inadequate.

Upgrading the MicroServer soon increases the cost significantly, to much more than what it would cost to get a decent NAS with a built-in OS and the ability to serve websites and so on. In fact, unless you have a very specific need to have a server with a fully accessible server OS installed, we would probably steer you more in the direction of a NAS instead of the HP MicroServer.

That said, it is a quiet and reasonably powered tiny server. Undoubtedly, there's a need somewhere in an organisation for the HP ProLiant Gen8 MicroServer G1610T, but that need may well be too specialist for most users.



▲ *The HP ProLiant G1610T is good for small business or individual user*



CuBox-i4Pro

DETAILS

- Price: £135
- Manufacturer: SolidRun Ltd
- Website: goo.gl/PJNnn9
- Required spec: Various options and models available, need software from SolidRun to install other OS



▲ *It's ideal for small projects, but a little slow as a dedicated server*

There was a report a year or so ago in the New York Times that reported on the death of the traditional micro server, in favour of the Arm-based server. In it, the writer held that the future server room would be filled with legions of small footprint, multi-cored ARM servers, all joined in a supercomputer-type affair.

We haven't yet reached that point, but with the likes of the CuBox-i4Pro, it looks like the total ARM-based server room of the future may be closer than you think.

The CuBox-i4Pro is a little different, for sure. You could be forgiven for thinking it's about as much as a micro server as a Raspberry Pi 2 inside a case is, and in some ways, you're not wrong. But as well as the usual RPi-type of project work the CuBox is capable of, it's also sold as a minute media, database and storage server.

It's a remarkable little device, measuring just 2 x 2 x 2 inches and weighing a mere 91g. Inside you'll find an ARM i.MX 6Quad, four-core processor running at 1.2GHz, 2GB of memory and an 8GB micro-SD card that can come preloaded with a choice of either Android 4.4 or OpenELEC/XMBC.

The i.MX processor is an interesting choice here, as it's

quite a powerful CPU considering its size. The GC2000 GPU is more than capable of outputting 1080p content, as well as 3D content, and it's capable of addressing up to 4GB of memory.

Although small, the CuBox does manage to pack in a gigabit Ethernet port, a pair of USB 2.0 ports, micro-SD slot, an HDMI port, eSATA, optical audio out, an IR receiver and transmitter, and the same kind of power connection as an Android phone.

If the pre-installed stock versions of Android, OpenELEC or XBMC don't float your boat, then you can always opt for a number of other Linux,

ARM-supporting operating systems. You can install Debian, Arch Linux, Fedora 20, OpenSUSE or XBian, to name just a few. Basically, if you can install a more complete Linux OS, other than one that's solely designed for media sharing duties, then you'll have a world of server-based abilities at hand.

As far as cost is concerned, the CuBox comes in various flavours. The entry-level and lesser-powered CuBox-i1/i2 costs in the region of £75. As the range improves in specification, the cost rises, to the CuBox-i4Pro, which can cost from £135, depending on where you shop and if you

take import duties into consideration, should you order from the US or China.

Admittedly, although there's a certain novelty value to the CuBox, it's desperately slow at times. Serving media can be fraught with frequent glitches, stuttering and other such performance lag. Android on the CuBox is at times diabolically slow, but things are greatly improved when you install Arch or Debian.

With a more – excuse the phrase – normal Linux distribution installed, the CuBox is much improved and does a decent job. But there are times it's still a little too slow for comfort.

Micro Servers

Fujitsu Primergy MX130 S2

DETAILS

- Price: £536
- Manufacturer: Fujitsu
- Website: goo.gl/cyCRMz
- Required spec: Server OS required

We looked at the tower versions of the Fujitsu Primergy range of servers in the previous group test. They're good, entry-level servers for organisations, small businesses or individual users with specialist needs.

This time, though, we have the micro server version of the Primergy range, specifically the MX130 S2. Our model comes with an AMD Athlon II XLT V66C, dual-core 2.8GHz CPU, 4GB of DDR3 memory and a 1TB hard drive, which was OS free and left us to install Ubuntu Server 14.04.2 LTS.

The dimensions of the MX130 S2 are 98 x 383 x 340mm, and it weighs around 8kg. Connectivity is reasonably good, with eight USB 2.0 ports (two at the front of the case, six at the rear), DVI, two PS/2 ports, a serial port and a single gigabit Ethernet port.

Internally, you can max the memory out to 16GB should you wish, and there are six SATA connections with support for RAID 0, 1 and 10. You'll also find single PCIe x16, PCIe x4, PCIe x1 slots and a standard PCI slot.

It's a decent powered machine and fairly quiet too, although compared to the absolute silence from the CuBox, it may as well be an earthquake in the middle of a cathedral. But although this isn't a cutting-edge server, it offers plenty of upgrade options and the possibility of

expanding through the PCI slots into almost any situation the user requires from it.

Our installation of Ubuntu went onto the hard drive smoothly, and other machines on the network connected without issue. Media streamed from the internal drive without

any sign of lag, and it was fine with other tasks such as being a print server, hosting for FTP, proxy access and so on.

In terms of cost, the price varies from shop to shop. The version we had on test cost £526, which making this one of the more expensive units on

test. However, when put into perspective, the Fujitsu Primergy MX130 S2 is reasonably priced considering what you can do with it and the potential it has for expansion.

The case is quite slim, so it can be stood vertically, thanks to the plastic stands that come with the package. Thanks to the fact that it's slim, it's also good to stack horizontally, and while that's not an ideal setup for a group of servers, the MX130 thankfully runs pretty cool and doesn't build up a lot of heat.

To conclude, it's a good server. It may not have the benefit of cuboid looks like the HP ProLiant or the modern ARM-based technology and diminutive proportions of the CuBox, but it's a solid base and one that's designed for stability and performance over time. That's one of the most important factors when purchasing and sourcing a server model. In short, it'll function perfectly well, and it makes for an ideal small server.

▲ *A tad expensive, but the slim form works well enough*

▲ *It makes for an ideal starter server*



Fujitsu Primergy TX1320 M1

DETAILS

- Price: £786
- Manufacturer: Fujitsu
- Website: goo.gl/a7xiA5
- Required spec: Server OS required, good cooling solution



▲ Heat issues appear to be a bit of a problem, though

If the Primergy TX M1 range sounds slightly familiar, it's probably because in the tower server group test, we looked at the Primergy TX1310 M1, which is part of a range of servers that range from the entry level through to a 12-core multi-processor monster.

The Primergy TX1320 M1 is a slimmer and much smaller member of this same range, but it still manages to pack in an Intel Xeon E3-1220-V3 3.1GHz CPU, 8GB of memory and a 1TB hard drive, which again is OS free.

Connectivity consists of four USB 2.0 ports, two USB 3.0 ports, serial, VGA and two gigabit Ethernet ports with a third gigabit Ethernet port for remote management

using iRMC S4. Internally, the motherboard offers memory upgrades up to 32GB, four SATA connections, two low-profile PCIe x8 slots, a single low-profile PCIe x4 and a final low-profile PCIe x1 slot. Not bad for a case that only

was the continuous drone of the fans, which aren't the quietest we've ever heard.

When under some stress, the case was emitting a fair amount of heat, and standing around the back of it like having a hairdryer

the heat output. How this will translate to a non-server room environment in the middle of summer remains to be seen.

If you factor in the cost, the potential for overheating and the noise, then there seems little reason to recommend the TX1320 M1 other than the performance value it offers.

In the end, it will greatly depend on your setup and the amount of money you're willing to spend for the luxury of having a small footprint server for your business needs. As there are, again, far better options available in the form of dedicated NAS units.

“ There seems little reason to recommend the TX1320 M1 ”

measures 98 x 399 x 340mm and weighs around 9kg.

There's a fair amount of expansion and upgrade potential with the TX1320 M1. Not as much as the MX130, admittedly, but generally enough to produce an exceptionally powerful server in a more compact chassis.

The server ran well enough. There's more than enough power to deal with any server-related tasks, alongside media serving. We did notice, though, that the heat levels from the TX1320 were a little high, even when it wasn't doing much to stress the components. The result

being blown on you. In a well-cooled server room, this might not be too much of a problem, but if you consider that the TX1320 M1 is more likely to be purchased by a smaller company, which won't have access to the Scott of the Antarctic, frosty beard producing cold air of a server room, then excess heat could be an issue.

In addition to the heat, the other problem is the cost. The Fujitsu Primergy TX1320 M1 that we had available for testing cost £786, which is quite a lot to fork out.

In our tests, the TX1320 M1 performed well enough, and it was still stable despite



▲ It's an okay server, the Fujitsu TX1320



Micro Servers

WD Sentinel DS5100

DETAILS

- Price: £1800
- Manufacturer: Western Digital
- Website: goo.gl/xsXDDW
- Required spec: Windows Server 2012 deployment strategy, deep pockets

The WD Sentinel is a kind of cross breed between a NAS unit and a fully fledged, mini tower server. It's an impressive looking specimen, to say the least, but has it taken too much on and become a strange concoction that doesn't fulfil either role particularly well?

Measuring 205 x 223 x 170mm and weighing just 5.5kg, the WD Sentinel manages to house an Intel Xeon E3-1220L V2 2.3GHz dual-core processor, 8GB of memory and a 320GB drive that holds the OS, which is Windows Server 2012 R2 Essentials.

It comes in two different models, a 4TB version and an 8TB one, using either two 2TB or four 2TB drives. From within Windows Server 2012 you can configure the drives to RAID levels 0, 1, 5 and 10 or JBOD,

▲ *It is very good but blooming expensive*

as well as configure the file and folder sharing, IIS, virtualisation, desktop deployment and Office 365 integration, among other things.

Connectivity on the Sentinel is reasonably good. There are four USB 3.0 ports, two USB 2.0, VGA and a pair of gigabit Ethernet ports. Additionally, there's also an IPMI (Intelligent Platform Management Interface) Ethernet port available for remote management connections.

The Sentinel is a sturdy little piece of technology. The steel chassis and large rear fan keep the entire unit cool, while some vibration and sound dampening internally manage to reduce the audio impact the server has on its surrounding environment. The only issue in build quality is the rather flimsy door that opens up to grant you access to the four drive bays.

You purchase the Sentinel with Windows Server pre-installed and ready to be added to or become the domain controller for your network.

As far as we could tell, there's no way you can opt for an alternative OS. Maybe a clever hacker could install a Linux distro onto the dedicated OS drive in the Sentinel, but we didn't try it out in this instance.

It's certainly a good enough mini server, and there's plenty you can do with Windows Server 2012 R2 Essentials other than just use it as a file and media server. And there's more than enough performance from the CPU and memory to make sure it'll work without any hint of lag. However, for this NAS/server combination device, you're going to have to spend a king's ransom.

The model we have on test, the 4TB version, comes with a



price of £1,800, and you can add around another £600 if you want the 8TB model. This is an extraordinarily expensive server, even with the decent specification available. Because of that, we're not sure it will become the must-have unit that WD hopes it will.

For the individual, the WD Sentinel DS5100 is an enormous expense and really not worth considering. For a small business, we're tempted to say the same. Even a larger enterprise would find more value from another solution.

It's good, but not so much it justifies the cost, specially since there are far more effective solutions available.



▲ *It is a NAS? Is it a micro server? It's the WD Sentinel DS5100*

QNAP TS-253 Pro

DETAILS

- Price: £270
- Manufacturer: QNAP
- Website: goo.gl/GRZLku
- Required spec: One or two drives to use in the enclosure, OS for virtual machine setup

As this is the last entry in the group, we thought we'd look at something a little different but still within the realms of the micro server.

Since the last entry was a kind of hybrid server and NAS station, we recalled that QNAP offers something similar, which could be used to test an idea we have concerning micro servers and modern NAS units.

The QNAP TS-253 Pro is a two-bay NAS solution with an impressive CV. This NAS unit can take the latest SATA-3 6Gbps 6TB offerings from the likes of Seagate and WD, with multiple RAID levels on offer. There's an SSD cache acceleration feature that improves IOPS performance, a pair of gigabit Ethernet ports, HDMI and three USB 3.0 ports (two at the rear, one on the front).

Its diminutive form (150 x 102 x 216mm) hides the most important feature of this advanced NAS unit: a 2HGz Intel Celeron quad-core processor (with turbo up to 2.41GHz), 8GB of DDR3L memory, 512MB flash memory and the excellent QTS 4.1 embedded Linux operating system.

This level of performance in a NAS is unique, to say the least, but it's there to help power the many software features this thing has. For



▲ The QNAP NAS unit, accuse us of cheating all you like, but we think it's the perfect micro server

▲ With the Virtualisation Station app, you can run all manner of server operating systems

example, the TS-253 can be used as a virtualisation station, with support for VMWare images, Citrix and Microsoft Hyper-V. This means you could host a number of virtual machine images off the NAS to be used by any clients on the network, and the setup is simplified thanks to the downloadable apps from the QTS store. In the theme of this group, we used a virtual image of Ubuntu Server 14.04.2 LTS to test our theory.

The HDMI port can be used to connect directly to a TV and play stored content, but also if you hook up a keyboard and mouse, the TS-253 can be used as a PC through an ingenious technology known as QvPC. What this does is allow you to access any of the QTS and hardware NAS functions, even the virtual machine images you may have stored and XBMC – which can then turn the TS-253 into

a media centre, including support for an MCE remote. Believe it or not, you can also use it as a complete surveillance hub, and there's also a private cloud feature, a powerful backup and disaster recovery solution, AES 256-bit encryption and real-time and offline video transcoding to UltraHD 4K specifications.

The list of features here is exceedingly long, and in real-world terms, you may not even scratch the surface of what the TS-253 Pro can do. In our tests, we managed to utilise as much of the functionality as possible; we even had it streaming 4K media from YouTube while hosting the Ubuntu Server virtual machine, along with its usual folder sharing duties. And we're happy to report, there wasn't even a hint of a struggle from the CPU.

Our theory was that a modern NAS drive could take on the role of the traditional

micro server and perhaps even beat it into submission. In the case of the QNAP TS-253 Pro, we think it won by knockout. Moreover, the TS-253 only costs in the region of £270, which is excellent value for money considering what you can do with it.





QNAP TS-253 Pro

There's good cause to have the QNAP TS-253 Pro as the Best Overall. It's the ideal micro server, you can install a server OS (MS, Linux, OS X) as a virtual machine, and you can use the built-in server functions of the NAS to great effect too.

There's not much this mini server/NAS can't do.



CuBox-i4Pro

It may be somewhat underpowered, but we quite liked the CuBox-i4Pro. It's amazingly small and can have a number of Linux distros installed to accommodate the user's demands.

Although the other mini servers on review are more powerful, there's a lot of potential project work that the CuBox would be ideal for.

How We Tested

Each server had Ubuntu Server 14.04.2 LTS installed as the main OS, unless otherwise stated in the review. We tested file and folder sharing, media sharing, FTP setup and serving, cloud setup and virtual machine setup.

	HP ProLiant Gen8 G1610T	CuBox-i4Pro	Fujitsu Primergy MX130 S2	Fujitsu Primergy TX1320 M1	WD Sentinel DS5100	QNAP TS-253 Pro
Price	£179.99	£135	£416	£786	£1800	£270
Dimensions	229 x 245 x 232mm	50 x 50 x 50mm	98 x 383 x 340mm	98 x 399 x 340mm	205 x 223 x 170mm	150 x 102 x 216mm
Weight	6.5kg	91g	8kg	9kg	5.5kg	1.74kg
CPU	Intel Celeron G1610T 2.3GHz	ARM i.MX 6Quad 1.2GHz	AMD Athlon II XLT V66C 2.8GHz	Intel Xeon E3-1220-v3 3.1GHz	Intel Xeon E3-1220L v2 2.3GHz	Intel Celeron 2.0GHz
Memory	2GB	2GB	4GB	8GB	8GB	8GB
Storage	500GB	8GB micro-SD	1TB	1TB	4TB/8TB	1TB
OS Installed	OS free	Android or OpenELEC	OS free	OS free	Windows Server 2012 R2 Essentials	QTS 4.1 Linux
USB Ports	Seven – 2x USB 3.0, 5x USB 2.0	2x USB 2.0	8x USB 2.0	Six – 2x USB 3.0, 4x USB 2.0	Six – 2x USB 2.0, 4x USB 3.0	3x USB 3.0
Video Ports	VGA	HDMI	DVI	VGA	VGA	HDMI

Your Letters

Something For Nothing

I've been following with interest the recent letters about piracy, and I think there's truth to both sides of the argument. Yes, there are certainly people in the world who'll avoid paying for things wherever they can, but it's not normally because they enjoy stealing content (though I'm sure those folk do exist as well). I think in most cases it's just because people can't afford the content that they want, because of the poor state of the economy.

Would it be better for these people to spend their money on movies and TV shows rather than buying food? Of course not. Does the industry lose anything from them pirating this stuff, though? I don't think so. If they didn't download stuff from the Pirate Bay or whatever, they just wouldn't see it at all, so there was never a sale to be lost in the first place.

Of course, there are some folk with some expendable cash that they could spend on movies, but they'd rather pay nothing. I think in

some cases, this is because the prices are so high. Why would you pay £1.50 to watch a TV episode when you know it was free when it was originally broadcast? It's already made its money, so surely a fiver for a whole series would be more fair.

Content does need to be paid for, and those who make it also deserve to make some money for their work, but overcharging is not the way to encourage pirates away from the illegal stuff. Services like Netflix are a much better alternative, but there's also room for what Channel 4 does. Rather than charging for its old content, it plays adverts – just like it does on TV. Personally, I don't mind sitting through a few ads to get free entertainment, and if I don't like the ads, I can just mute them like I've always done.

Barry Passingham

Linux Or Windows

I rather feel Ken Hough's response to my letter in issue 1361 merely reinforced the point I was making: I was not commenting on the relative values of operating systems (or indeed did I ever mention a preference for Windows) but on the overly focused perceptions of many Linux devotees.

I was simply pointing out what I saw as Linux's reasons for failing to make real inroads into the consumer market at an everyday level. He's absolutely correct: installing Linux *is* easy; it is the necessity to install at all that is the problem. Similarly, yes you can get PCs with Linux installed, but not where Joe Public shops, and you have to go looking for them. Ignore Micro Mart readers; we usually know what want and are always willing to go looking for it, but most users are OS

neutral. They don't care and will buy what they can afford from high street stores.

Similarly I wasn't saying that WSH/WMI etc is better or worse than Bash – merely that comparing Bash with batch files was a false comparison (as an aside, regarding whether WSH is more or less powerful, I haven't actually come upon any task on a PC or network that I have been asked to do that I haven't been able to do quite easily in WSH).

On a final point, it isn't 'most' computer users I react with, but 'virtually all' of them who use Windows for real commercial work. The ability to read simple files from Windows applications is not any meaningful form of compatibility: the ability to use the Windows-specific applications is what is the driver.

Dick Pearson

GET IN TOUCH...

By email

letters@micromart.co.uk

By post

Micro Mart
30 Cleveland Street
London
W1T 4JD

Online

forum.micromart.co.uk

SUBSCRIBE NOW!



Subscribe to **micro mart** today and save on the single issue price.

Each issue of **Micro Mart** will be delivered directly to your device each week.

SEE NEXT PAGE FOR SET-UP INSTRUCTIONS

▶ HOW TO SUBSCRIBE...

...on an iPad or iPhone

- STEP 1** Return to the *Micro Mart* library
- STEP 2** Choose your subscription term and tap twice on the 'price' box
- STEP 3** Choose whether to create an optional *PixelMags* account
- STEP 4** Enter your *Apple ID* password to confirm



...on a Kindle Fire

Kindle Fire subscriptions come with a **FREE** one month trial.

- STEP 1** Tap '**Free Trial Subscription**' in the *Micro Mart* library
- STEP 2** Chose your subscription term from the drop down menu on the popup that appears
- STEP 3** Tap '**Subscribe**'



...via the Zinio app

- STEP 1** Search for *Micro Mart* via the search box in the *Shop* tab
- STEP 2** Tap the '**Subscribe**' button
- STEP 3** Choose whether to create an optional *Zinio* account
- STEP 4** Enter your *Apple ID* password to confirm



**Subscribe to *Micro Mart* today and
save on the single issue price**



Microsoft Build 2015

David Briddock examines the news, announcements and demos from this year's Build conference

Microsoft's Build 2014 conference had the usual mix of desktop, web, mobile, cloud and gaming content. But because Windows 8 had been around for a while and with continuing doubt over Nokia and Windows Phone devices, it didn't generate any noteworthy highlights to create high levels of media or business interest.

Just one year later things couldn't be more different.

Buildup To Build

The big news this year was of course Windows 10, the most comprehensive and eagerly anticipated update to Microsoft's operating system for decades. With expectations of a summer release, there were frantic efforts to secure developer and media places at Build 2015 (buildwindows.com).

Yet it wasn't just Windows 10 that had been raising the excitement levels. There was also Project Spartan, a replacement for the aging Internet Explorer 11 browser; Office Sway, a completely reimagined way to author visually engaging, fully

interactive cloud-based content in real-time; and a powerful range of free-to-download apps that work across all Windows 10 platforms.

Microsoft's growing hardware presence has been bolstered by the 2-in-1 tablet/laptop Surface Pro 3 and entry-level Surface 3 products (microsoftsurface.ms), the health/fitness Microsoft Band wearable device (microsoftband.ms), the upgraded Kinect v2 hardware for Windows (microsoft.com/en-us/kinectforwindows) and even a foldable keyboard (goo.gl/AjJHJJ).

All interesting stuff but, of course, what Build 2015 attendees really wanted to know more about was Microsoft's HoloLens headset, which was announced earlier this year as part of the range of its holographic hardware and software initiatives.

Windows 10

Although no official Windows 10 launch date was announced at the conference, it looks like a late summer launch for the client



Universal Windows Platform

version on x86-based PCs and large tablets. Windows 10 releases for phones, small tablets, Xbox and HoloLens will probably occur later in 2015.

On-stage demos showed improvements to Windows Start, Taskbar, Task View, Action Centre and the keenly awaited Virtual Desktop feature. And there's an updated Continuum app, which can create a desktop-like display for a monitor-connected Windows Phone.

In Windows 10, Cortana becomes a rich, flexible Bing-powered digital assistant. The original Windows Phone technology has been updated with advanced speech recognition, natural language processing and machine learning capabilities from Microsoft's Research labs.

“ All Universal Windows Platform apps operate on a runtime that is installed on every Windows 10 platform ”

This means Cortana now continually learns about its user's preferences, so it understands their daily routines and habits. Consequently, the assistance on offer becomes increasingly personalised over time.

And yet this deep level of user-focused data capture and analysis is something that increasingly concerns many prospective Windows 10 customers. Everything you do in Windows 10 is captured: every app you run, every search you make, every web page you view, every Cortana voice interaction you make and so on.

Of course, this is all used to make the Windows 10 experience more personal and productive – something that will delight many users, especially when they've no idea how it's achieved. But how all this data is stored and managed could become a big issue when Windows 10 starts to spread around the world.

Universal Windows Platform

Probably the most far-reaching aspect of the Windows 10 system is its new Universal Windows Platform model. From Microsoft's perspective, this major architectural change achieves two key goals.

Firstly, it enables Microsoft-branded software to exist on a wider range of platforms, such as PCs, tablets, smartphones and even IoT boards like the Raspberry Pi 2. And secondly, it allows software developers to maximise the payback from time spent designing, coding and testing.

What it means in practice is that all Universal Windows Platform apps operate on top of exactly the same Windows runtime, which is installed on every supported Windows 10 platform, regardless of whether it's based on an Intel x86 or AMD processor.

This is a huge deal for developers. Finally they have a single platform on which to build apps that are equally at home on smartphones, tablets and PCs. They can use the same coding tools, solutions and techniques and application programming interfaces (APIs), and it's much easier to address issues like performance and security.

Office Enhancements

Microsoft CEO Satya Nadella recently called Office 365 Microsoft's most strategic API. And many of the developers attending the Build 2015 conference would probably agree, especially now it's a Universal Windows Platform app.

In addition to the classic Office suite of Word, Excel, Powerpoint and Outlook, we now have the new Office Sway app. Sway turns any browser into a story-telling digital canvas. A dynamic, interactive canvas without borders, edges, page breaks, cells or slides, which is easily filled with text, photos and images plus audio and video multimedia.

All Office apps now have something called Integrated Services. These act like plug-ins and display alongside the document, spreadsheet, presentation or Sway. Integrated services are written by third parties and provide quick access to detailed information, image libraries, raw data collections and much more.

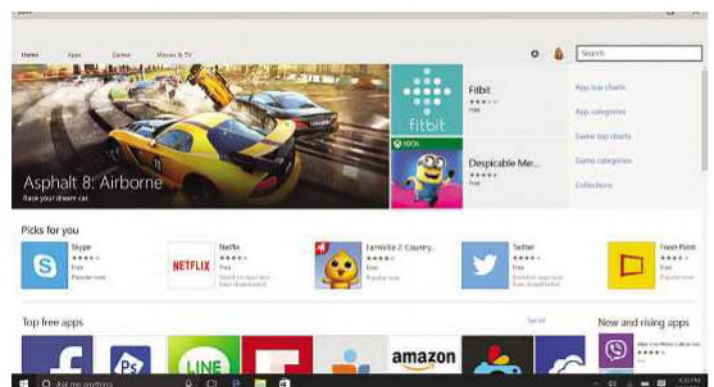
From the developer perspective, there's an extended API to access Microsoft's impressive Office Graph, a data-based machine learning technology. And the news of an SDK to embed Skype services created a warm round of applause.

Microsoft Edge

During the first day keynote, Microsoft's brand new browser for Windows 10, previously known as Project Spartan, was given its official name. Microsoft Edge will be available across the Windows 10 device family – in other words, on all desktops, laptops, tablets, Windows Phones and even it seems some IoT devices (such as the Raspberry Pi 2).

There are four stand-out Edge features: a brand new web page rendering engine, Cortana integration, web page inking and enhanced web page reading.

The new engine is fully compatible with the modern web, with all its subtle intricacies, and it has built-in Flash support. Microsoft stated the performance is better than all other browsers engines, Chrome included, when tested with Apple's and Google's own benchmarks.



▲ Microsoft Store



▲ Visual Studio Code

Web page inking plays a big part in separating Edge from its Internet Explorer 11 predecessor. With inking, you can write (using a finger, mouse, stylus) or type directly on the web page – say, to add a comment or pose a question. Inking could become a much valued Edge feature, especially if you own a Microsoft's Surface 3 hybrid tablet/laptop device or a touchscreen 2-in-1 laptop.

Windows Store

The Windows Store has been extended and simplified. It's now the place to get any Universal Windows Platform app, regardless of platform and chipset (x86 or ARM). How you discover these apps has also been improved.

App developers can link apps across devices, meaning a single purchase is all that's required to install the app on your phone, tablet and PC. New monetisation options include common price tiers, which brings the \$0.99 and \$1.29 prices to PCs. And there's an updated advertising SDK that supports rich media standards.

In addition, there'll be a mechanism for developers to directly respond to app reviews and thus address any potential confusion or other issues that hurt their app ratings.

Azure Services

A significant portion of the first day's keynote was given over to a discussion about Azure. Microsoft increasingly promotes Azure as the intelligent cloud, and it's certainly growing in strength, stature and influence.

Container deployment is a key Azure element. It's achieved using the world-renowned Docker (docker.com) technology. Docker supports both Windows and Linux configurations, plus web-centric or app-based services – another sign of today's increasingly open Microsoft strategies.

Azure Machine Learning is another big thing for Microsoft. Machine learning in general is a big and complex subject, but the user-friendly Azure Machine Learning interface, with its drag-and-drop operation and rapid analysis evaluation certainly seems a step in the right direction. Data from the Microsoft Band, a fitness/health wearable device, is already processed by Azure Machine Learning technology, and it's employed by numerous companies to extract meaningful patterns from customer, manufacturing and scientific data.

Visual Studio Code

A Windows-based PC is by far the most popular platform for software development. This is partly down to the wide range of low-cost or free-to-download code editors, but Microsoft's powerful, multi-language Visual Studio development tool doesn't fit into this category.

So for the assembled coders, one of the biggest announcements came on day one, when Microsoft announced the launch of Visual Studio Code (VSCode). This new member of the Visual Studio family is a lightweight code editor for writing modern web and cloud applications.

VSCode offers a feature-rich coding environment, with built-in support for multiple languages plus syntax highlighting (for C++, Visual Basic, PHP, Python, Java, Objective-C, CoffeeScript, XML, Batch, F#, DockerFile, HandleBars, R, PowerShell, Luna, Jade and Markdown), code IntelliSense assistance, bracket matching, auto indentation, code navigation, code refactoring, powerful debugging capabilities and out-of-the-box Git support.

Critically, VSCode is platform independent, so it runs on OS X and Linux as well as Windows. This is the first time that Microsoft has offered developers a true cross-platform code editor. The full Visual Studio tool is still a Windows-only product.

“ Visual Studio Code is a lightweight code editor for writing modern web and cloud applications ”

Porting To Windows 10

Microsoft's Visual Studio tool builds Universal Windows Platform apps plus a range of connected services, such as Office 365, Azure Mobile Services and Application Insights, using the Microsoft .NET Framework and a range of programming languages.

But Microsoft is keen to help developers take existing apps and port them quickly and easily to the Universal Windows Platform, so it has created Project Astoria, a Universal Windows Platform Bridge toolkit. Currently there are four bridges.

First, as you'd expect, web-centric software is supported, and this also includes a useful facility to convert browser-based code into a native Universal Windows Platform apps. These apps can call Universal APIs from JavaScript to access notifications, contacts, calendars, maps, cameras, Cortana and so on.

Second there's support for existing .NET and Win32 applications. This is critical as there are around 16 million

Links

Build 2015: buildwindows.com

Windows 10: windows10.ms

Windows Store: microsoftstore.com

Microsoft Edge: edge.ms

Office Sway: sway.com

HoloLens: hololens.ms

Windows 10 IoT: dev.windows.com/en-US/iot



▲ HoloLens headset

already out there, and some are vitally important to the success of Windows 10, such as Adobe's Win32-based Photoshop and Photoshop Essentials products, which was demonstrated post-conversion live on stage.

But Microsoft also revealed bridges for both Android apps (written in Java or C++) and, most intriguingly, Apple's ObjectiveC code. The latter means that existing iPhone/iPad apps and games can be ported to the Windows 10 platform, and with this bridge many of these ports could take just a few days of focused effort.

Once ported, these apps can access any part of the Universal Windows Platform. In other words they'll be able to do things that couldn't be achieved on an Apple or Android device. For example, enabling deep integration with Cortana and Xbox Live, or using the Microsoft Store to manage in-app purchasing.

Holographic

Unsurprisingly, the conference room was buzzing when it came to the HoloLens announcements section, right at the end of the first day's three-hour keynote. Inside the headset there's enough processing power to run a full version of Windows 10, while delivering a blend of virtual reality and augmented reality that Microsoft call 'Mixed Reality'.

Most importantly, all the holographic elements the HoloLens wearer sees are actually just Universal Windows Platform apps. This is fantastic news for the Windows developer community, as they already have all the languages, tools and knowledge necessary to take full advantage of this groundbreaking technology.

And the news got even better for the assembled audience when Microsoft announced it had brought hundreds of HoloLens units to the conference, ensuring everyone could experience first-hand what it's like to enter and interact with a holographic world. Post-event feedback suggests most were bowled over by this encounter.

More details emerged on day two in a one-to-one chat with holographic guru Alex Kipman. Interestingly, one of the main reasons there's nothing like HoloLens around today is that it has a separate, specialised Holographic Processing Unit (HPU) chip in addition to the main processing (CPU) and graphics processing (GPU) chips.

The HPU captures and processes data from the cameras and sensors. This includes scanning and mesh-mapping the immediate environment, capturing the headset wearer's movement and gestures, monitoring background sound and voice commands

and much more – all in real time. Altogether, it amounts to around one trillion bits per second of data!

The HoloLens demos were even more impressive than in January. Highlights included a video holo-window that tags along as you walk around the house, an interactive model of the human body and a rather cute real/virtual robot.

There's no doubt there'll be huge demand for this hardware just as soon as it's released, and Kipman hinted that other manufacturers might already be building HoloLens-like units, so could we see a Sony, Samsung, Dell or even Nokia headset within the next 12 months?

IoT

In essence, the Internet of Things (IoT) connects a range of data-capture sensors to the internet – sensors located on diminutive boards, like the Raspberry Pi and Arduino boards.

Microsoft wants to play a big part in this area, so during Build 2015, it released images of Windows 10 for the Raspberry Pi 2 and a few other boards (dev.windows.com/en-US/iot).

“ Microsoft released images of Windows 10 for the Raspberry Pi 2, and a few other boards ”

The website also has a collection of tutorials, sample code and example IoT projects (microsoft.hackster.io).

And if your Raspberry Pi is running Linux, you can write code today using the new Visual Studio Code editor.

Future

It's clear Microsoft's future is tightly linked to the success of Windows 10, yet nobody knows how quickly individuals and organisations will upgrade to it. Microsoft has a worldwide target of one billion Windows 10 devices within the next three years. Ambitious yes, but with a free upgrade and a wide range of supported platforms, it's certainly possible.

Plus we already know Microsoft has plans for a major update of Windows 10 in 2016, code-named Redstone (after the *Minecraft* ore). Redstone is likely to be just the first of several major updates to Windows 10 over the next few years. **mm**



▲ HoloLens demo

RAID: Is It Worth It?

**Mark Pickavance looks at RAID and what you
can do to make this technology work for you**

I've written numerous features on RAID over the years in Micro Mart, as it progressed from being an exotic technology that was only used in servers to something that is available to almost every desktop PC owner.

Early solutions used SCSI, but eventually IDE and then SATA and SAS became the chosen connection technologies. The advent of SATA drives (and later SAS) made for much slicker cabling systems and better hot-swap drive trays, which can be useful in RAID. Even cheap boards now have some simple RAID options, even if they're just variations of striping (RAID 0) or mirror (RAID 1) functionality. The latest Intel platforms also offer parity plans (RAID 5) that combine performance advantages with resilience.

The basic premise of RAID is to take multiple drives, called the 'pack' or 'array', and make them appear to the system like they're a single drive. Depending exactly how they're put together, this can either result in a high performance system

or a damage resistant one, or even a subtle mix of those two different objectives.

But as attractive as that might seem, there is always a little pain to go with any gain. RAID 0 'striped' arrays configured for high speed achieve this by trading the survivability of the volume against the life of each disc in it. If you have a six-drive pack, you might see it outperform a single disk, but the death of any drive will kill the entire volume, which by definition is six times more likely to experience that failure.

Conversely, a RAID 1 'mirror' array or other protective striping organisation that allows for drives to expire, but which guarantees the data won't be lost, trades the overall capacity available for the protection offered. If data is in two locations, then it takes up twice as much space, as a rule. Given all these limitations and the huge capacity drives available, why do people use this technology?

Often they're looking to combine existing resources to gain an advantage or enhance an existing system in a cost effective way.

RAID can achieve those objectives if it's used well, though it doesn't come without some associated risks.

Those who decide to take the RAID route first need to decide how they're going to implement it, as there are several ways to cook this particular goose.

Soft, Firm Or Hard?

It might not be something you're ever aware of when using a PC, but some subsystems, like SATA hard drives, don't have much computing power of their own. They do largely what they're told to do by a computer, so the more of them that are connected, the greater drain they are on computing resources.

This is less of an issue these days, because machines are so powerful, but when RAID first arrived, it was a problem, which is why SCSI was a popular solution.

“ The basic premise of RAID is to take multiple drives, called the ‘pack’ or ‘array’, and make them operate to the system like they’re a single drive ”

In that technology, the SCSI interface has its own microprocessor dedicated to driving the attached hardware, so operations can take place without the direct involvement of the host PC. For example, a file is copied from one SCSI drive to another attached to the same controller. This would happen in isolation of the computer, which would be informed only of progress, errors and completion. But what does this have to do with RAID?

In a RAID system there's a more complicated than normal control of the drives and reorganisation of the data, both things that naturally lend themselves to a dedicated drive

The Many Flavours Of RAID

Here's an overview of what the more common RAID levels are called and how they're organised.

- **RAID 0:** Striped set
- **RAID 1:** Mirrored set
- **RAID 1e:** Combined mirror and stripe
- **RAID 3:** Striped with dedicated parity
- **RAID 5:** Striped set with distributed parity
- **RAID 6:** RAID 5 with additional parity block
- **RAID 01:** A mirror of stripes
- **RAID 10:** A stripe of mirrors
- **RAID 50:** A stripe across dedicated parity RAID systems
- **RAID 60:** Mirror of dual RAID 6 systems
- **RAID 51:** A mirror striped set with distributed parity (also called RAID 53)
- **RAID 100:** A stripe of a stripe of mirrors



controller. A hardware controller is the most expensive way to get RAID, but the performance offered by these solutions is exceptional, and they have the ability to do things independently of the PC to rebuild the RAID pack or activate hot replacements.

It's also very easy to take a controller card and its drives and move them to another PC relatively painlessly, should the computer fail. And the more sophisticated controllers will even hold write data in a battery backed cache, so power failure won't cause corruption in the RAID pack.

The type of RAID offered in most motherboards these days is more like a software RAID, where the PC does most of the controlling, though some functionality is handled by the chipset. It can't rebuild while being active or any of the other neat tricks that only dedicated hardware can do. It's also very dependent on the firmware and chipset configuration of that specific PC, and in that respect, moving it elsewhere is highly problematic.

And finally, there's entirely software RAID that's done in the OS, where everything is handled by the computer, creating a form of virtual RAID. This is transportable between systems but

	Advantages	Disadvantages
Hardware RAID	Performance – Because the CPU isn't involved directly in drive control, it can be doing other things, improving overall PC performance. And they often include drive caches to smooth read and write cycles. Flexibility – They're capable of migrating between difference schemes should you plans change. They're also bootable. Transportability – Easily moved to another PC. Resilience – Battery backed cache memory reduces the chance of corruption. Scalability – Controllers that can use 16, 32 or even 64 drives are possible.	Cost – Hardware controllers can be very expensive depending what features you'd like.
Motherboard RAID	Cost – It's included in the price. Performance – Generally good, even with a relatively low performance PC. Flexibility – While they can't generally migrate, they can be used as a boot volume.	Transportability – Not easily moved to another PC. Repair Time – A rebuild can't happen while the PC is being used. Resilience – Crashes or power cuts can damage the array. Install – Switching an existing system from AHCI or IDE to RAID can be technical.
Software RAID	Cost – It's included in the price of the OS. Performance – Generally acceptable, even with a relatively low performance PC. Easy install – No drivers required. Spanning – Make lots of different drives one big volume.	Repair Time – A rebuild can't happen while the PC is being used. Resilience – Crashes or power cuts can damage the array. Flexibility – They can be used as a boot volume normally.

tends to have other limitations, like you generally can't boot from the array.

To summarise, the options are shown in the table above.

What RAID Is Right For You?

If you refer to the 'Many Flavours of RAID' boxout, you'll see that there are plenty of possible structures for an array depending on what features you're looking for and how many drives you have available.

The tree most commonly used are RAID 0 (stripe), RAID 1 (mirror) and RAID 5 (parity). Striping gives you the performance of multiple drives running simultaneously but costs resilience. Mirroring keeps your data safe but does nothing for performance and reduces the amount of storage by 50%.

The attraction of parity packs is that you get most of the performance on offer by striping, but some resilience.

Minimum pack size is three drives for parity RAID 5, and you forfeit the capacity of a single drive to provide the redundancy. The downside of this option is that it needs more computing power than the other choices, and if two drives in the pack die, the data on it won't be recoverable.

If you use RAID 0, then assume at some point that you'll have a drive failure (it's inevitable, really) and that you should only put data on a location that you can recover from elsewhere.

Those that use RAID 1 should consider RAID 10 if they want a performance boost, but that will require a minimum of four drives, and you'll only get the capacity of two of them.

The parity option is an attractive one if you have plenty of drives, ideally four or five, and you keep a close eye on the status of the pack and have a spare drive handy if for whatever reason you have a failure and need to rebuild.

Whatever option you choose, I wouldn't make this the only data security that you have, because the added complexity that RAID naturally introduces has the potential to also increase the likelihood of failure, so be prepared.

Assuming I haven't put you off the idea entirely, how do you proceed? Well, firstly, here are some tips on precisely not what to do.

RAID: What Not To Do

While I was testing out some of the theories I've presented here, I ran into some problems that highlight what a minefield that RAID can be to the unwary. When I initially started testing RAID on a modern system, my first experiment was to try the entirely software RAID that Microsoft has included with Windows for some time now. It's built into the Disk Management console, so implementing it only requires that you cable up the bare drives and then right-click on them in the system to define the array you'd like.

That might seem painless, and as Windows software RAID can do many of the things that RAID on the motherboard can offer, surely you should use that, right? No, you really shouldn't.



▲ Even an entry-level hardware RAID controller, like this Adaptec 2260300-R 2045 RAID four-channel SATA/SAS card isn't cheap. One like this is about £160, and those with greater drive support and battery backed caches can run into thousands

In my first test, I took two 1.5TB Samsung drives and decided to turn them into a RAID 0 stripe, giving me a 3TB drive and a performance boost. Setting this up is remarkably easy. You just right-click on one drive, select 'Striped Volume' and then define what drives it includes.

That's fine, but what then proceeds isn't, because the system needs to check every single byte of those drives before it will sign off this configuration, and that takes seemingly forever. On my test system, it took about six hours to do two 1.5TB – a timescale that hints at silly waiting times for systems with larger capacity drives and more of them.

There is one use I'd put this aspect of Windows to, which isn't always supported by motherboard RAID, and that's spanning. While technically not actual RAID of any number, this feature allows you to take a collection of drives of any size and glue them into what appears to be a single volume. This might be useful if you have some unused drives of

various sizes, though you'll experience data loss if any of them subsequently die.

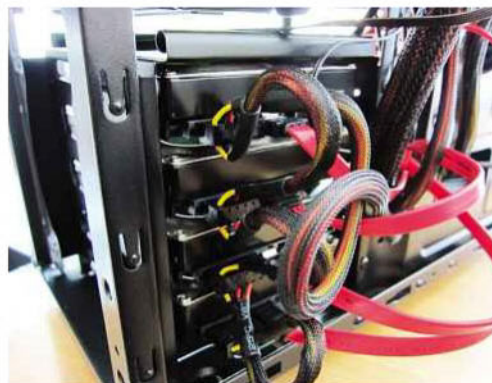
Motherboard Raid

The best combination of cost and performance is probably offered by motherboard RAID, which is really software RAID but linked more directly to the capabilities of the chipset and firmware. All the latest AMD and Intel chipsets offer this technology, and they have done for a number of years, so unless you have a really old PC, then it's a feature you'll have access to.

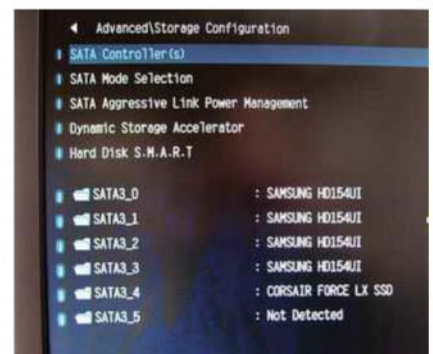
However, before anyone starts down this path, I'd seriously recommend you consider all the implications of adding RAID to your existing system, the downsides and the upsides, and I'd also make sure you have a complete and recent backup of the computer in case things go sideways for whatever reason. For my example, I've used a reasonably modern ASRock Z97-based motherboard, and while the exact details might differ, the basic



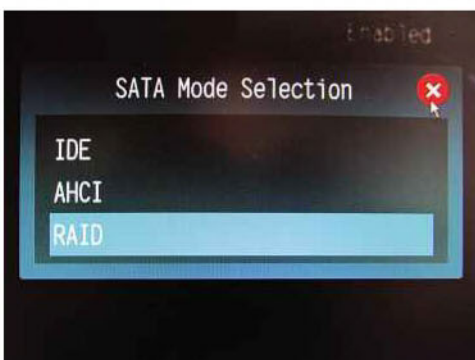
▲ For this exercise I had on hand four Samsung HD154UI drives that I purchased some years ago for my NAS box, but which I've since taken out of service. They're only 5400rpm disks, though the 1.5TB capacity can be combined to create up to 6TB of storage, depending on exactly what RAID type you use on them.



▲ Mounting the drives in the PC is very straightforward as long as you have sufficient SATA power connector and enough SATA data cables. What I would avoid is using Molex-to-SATA converters, because what you never want on a RAID system is a faulty connection of any kind. Once these are installed, you can fire up the PC.



▲ Rather than letting the PC into Windows, I've taken it into the BIOS, where I can check that all the drives I've connected are being identified by the system. As you can see here I also have a Corsair LX SSD in here, which for this experiment has Windows 10 on it. However, RAID on 10 is just like Windows 7 or 8, thankfully.



▲ By default, the drive subsystem on the motherboard is set to AHCI and must be altered to RAID to activate that functionality at a BIOS level. You must be aware that once you've done this change, a direct boot into Windows could cause the system to hang or crash. Installing the RAID driver beforehand might work, but not always.



▲ The maker of the motherboard, ASRock, provides a simple means for anyone installing a new OS, in the form of 'Easy RAID', which acquires the latest driver off the internet and then puts it on a USB key for you to access during the installation. This is simpler than locating it yourself, and guarantees you get the latest one.



▲ With RAID now active on the motherboard you can work with that subsystem by pressing Ctrl-I as the system boots. This takes you into the Intel Rapid Storage Technology Option ROM, where you can take your drives and make them into a RAID pack. What you mustn't do here is include the boot drive, unless you want it wiped.



▲ The RAID subsystem allows you to define RAID 0, RAID 1, RAID 5 or RAID 10, with up to six drives. You simply choose which option you'd like and the drives you want including in that pack. It's entirely possible to create more than one pack with different layouts, if you have enough drives. What it doesn't do is allow for hot spares.



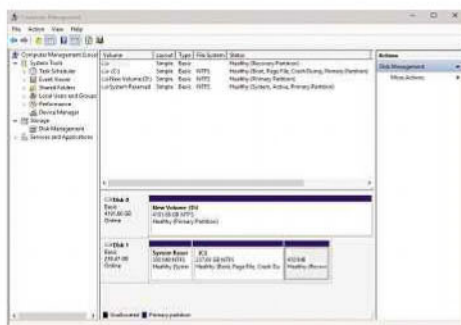
▲ One you've defined the RAID type and what drives you want in the pack, you just need to define the stripe size required. The system helpfully suggests stripe sizes for different RAID configurations, but you can tinker with these numbers and test what works best for you. For my testing I went with their recommendations.



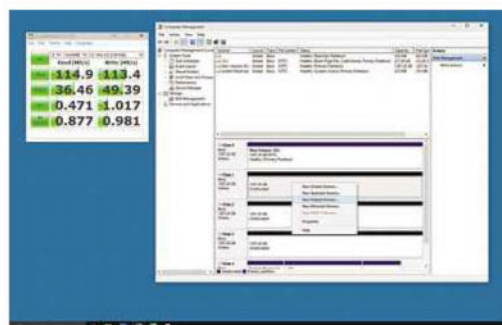
▲ The system gives you one final chance to change your mind, before utterly obliterating anything that might previously have been on them. It takes a matter of seconds to set this up, so there's no long wait like the one Microsoft gives you in its software solution. What's left to do now is make the system happy with RAID.



▲ After my Windows system crashed booting, I concluded the best method was to enter Safe Mode and install the RAID driver. In addition, I also located the register value that's recommended to alter when forcing a system to go from AHCI mode. As I was using Windows 10, I had some issues with this that I'll mention later.



▲ Once the drivers are installed and the system is in RAID mode and booting, you can go into the Management Console and format the new volumes like you just added a hard drive. The system really isn't aware that it's dealing with RAID, as most of that is happening before the OS loads.



▲ Once the system worked with RAID, I actually went back to the BIOS controls and deleted the pack so I could get a baseline value for a single drive. Then, successively, I tried a range of RAID and pack combinations to show what performance benefits, if any, you can get by using the various modes. Some are certainly better than others.

methodology of what happens is broadly similar to early chipsets and AMD platforms.

What you need to prepare beforehand is to find the RAID driver files, usually from the motherboard maker's website, and all the hardware you intend to deploy. In my example, I'm going to add some disks to an existing system and RAID them, but not include the boot drive. If you intend to boot from your RAID volume, you might need to reinstall Windows, as any existing configurations are usually installed in AHCI mode.

Here's how it should work, assuming you have a setup a little like the one I used.

Enough Theory, Let's Test

With the system now in RAID mode, the time was right to do some testing to reveal what advantages or otherwise each of the possible configurations offered. With four drives to choose, I have the possibility of three RAID 0 modes (2, 3 and 4 drives), a couple of three- and four-drive RAID 5 layouts and also a few mirror options with and without striping, and a single drive alone.

That last one is effectively the standard against which all other choices will be compared, because what we're trying to do is improve on that baseline level. What this obviously doesn't consider is how reliable any choice is. At this stage, the options are purely speed evaluated.

In interpreting these results, I need to clarify some anomalies, for which I have some explanations. But before those, the first obvious conclusion is that RAID 0 really works in terms of boosting drive performance. And the more drives you include, the greater the effect.

Generally, each subsequent drive adds another 85% performance over a single drive, and with six drives you'd probably have a system that operated at SSD levels but with conventional drives. You also have lots of space, because none of your drives are put aside for protection. The flipside to that equation is that any drive failure will be fatal for whatever data you put on this volume, and the more drives you have, the greater this scenario becomes.

RAID 1 doesn't have this problem, but it takes the shine off what performance you had already, so redundancy has a cost

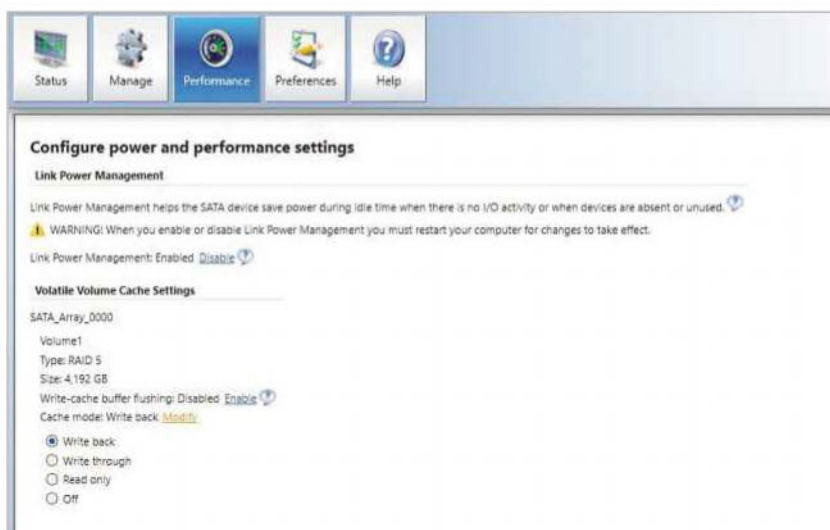
Benchmarks						
	No. Drives	Capacity in Drives	Benchmarks MB/s		% Faster than Baseline	
			Read	Write	Read	Write
Single Drive	1	1	114.9	113.4	-	-
RAID 0	2	2	214.3	210.6	86.51	85.714
RAID 0	3	3	322.5	316.6	180.68	179.19
RAID 0	4	4	427.1	425.8	271.71	275.48
RAID 1	2	1	109	104.1	-5.30	-8.20
RAID 5	4	3	316	55.54	175.02	-51.023
RAID 10	4	2	214.3	212	86.51	86.95

both in performance and available capacity. You can get some performance back using RAID 10, but you only get two drives worth of space for four drives. The answer should be RAID 5, balancing speed and total capacity, but as these numbers show, it is dire at writing. Or rather, it appeared to be.

“ A hardware controller is the most expensive way to get RAID, but the performance offered by these solutions is exceptional ”

Confused why it should be so bad, I did some research and discovered that for whatever reason, the driver doesn't automatically configure its cache control to the correct mode for RAID 5, and Intel doesn't point this out to you either.

Anyone testing this would immediately conclude that RAID 5 isn't a good choice, but with some work it can suddenly turn into the perfect combination. What you need to do is change the cache from 'Write Through' to 'Write Back' – something the Intel RST tool allows you to do under the 'performance' tab.



Once this change was made, the transformation was dramatic when I retested the array. Read speed was generally unaffected, but write performance was a stunning 600% better, and above what I got with four drives in RAID 0 mode.

Though I didn't have time to test it, I suspect RAID 0 write speeds would have been also improved by this cache mode. The only caveat is that, in general, Write Back isn't as safe as Write Through in terms of avoiding corruption in the event of a power failure, in case you wondered why this wasn't the default setting.

In conclusion, RAID 5 can be good, if you're prepared to tune the settings and take some risks with the potential disaster of a power cut. If you want this level of performance, redundancy and not to worry about corruption, then you need to invest in a hardware controller that has a battery backed cache.

Final Thoughts

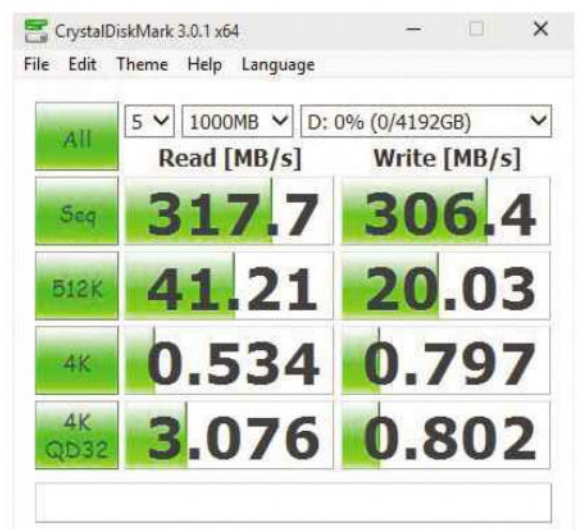
Before I talk about anything else, I need to cover Windows 10 and Intel RST, because this wasn't something I could easily cover in my instructions. If you're using Windows 7, you need to change the value of these from 3 to 0, before installing the drivers and rebooting:

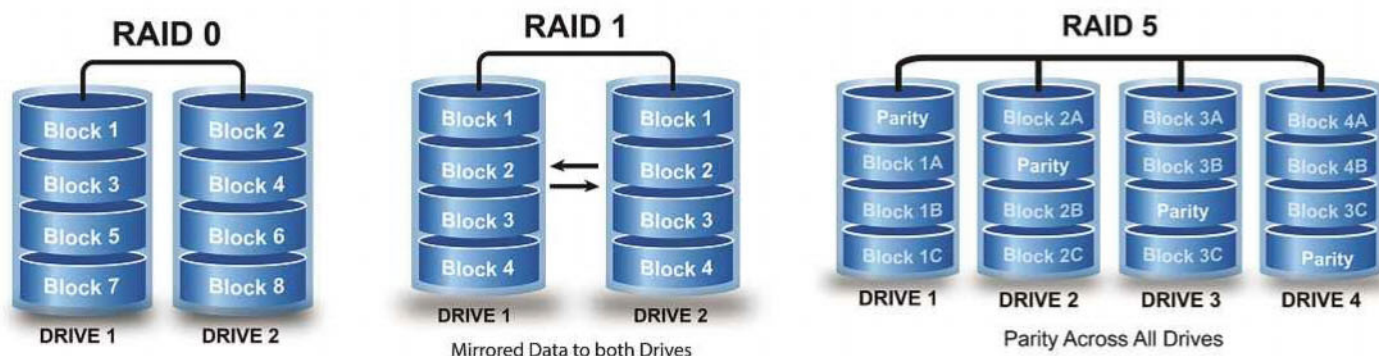
```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\pciide
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\msahci
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\iaStorV
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\iaStor
HKEY_LOCAL_MACHINE\System\CurrentControlSet\
Services\ataapi
```

Those using Windows 8 should alter these two in a similar fashion:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\storahci\
KEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\
Services\storahci\StartOverride
```

And, in theory, Windows 10 should be the same as Windows 8, but it isn't. With Windows 10, I was confronted by the Intel





RST installation routine that insisted on .NET 4.5 being on the machine, when this OS has .NET 4.6 pre-installed. You can't put a prior version on, and the install routine won't work without it.

How we've got this far down the line with Windows 10 with nobody at Intel noticing how badly they wrote the install routine for RAID, I've no idea. What I did to solve this was to use WinZip to pull the driver files out of the installation package and install them manually. And I then stole the management console apps from a Windows 7 PC that had

“ Anyone testing this would immediately conclude that RAID 5 isn't a good choice, but with some work it can suddenly turn into the perfect combination ”

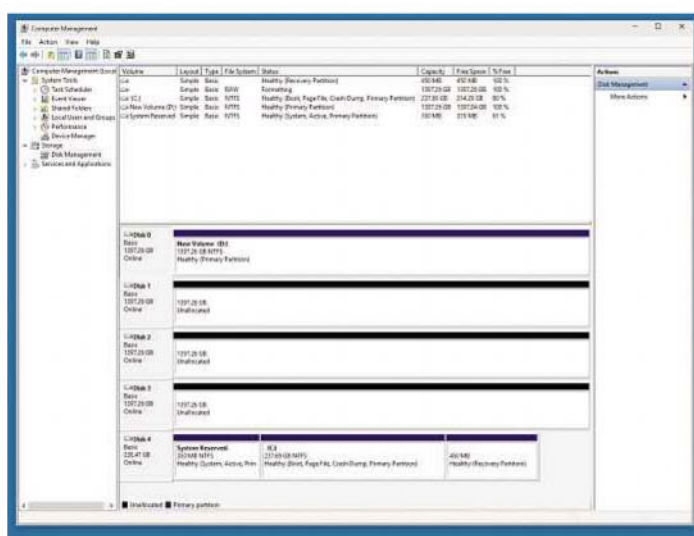
them on to get around that part of the roadblock. It all worked in the end, though I did have a few hair tearing moments along the way. My fault for using an unreleased OS, I guess.

Once those hurdles were overcome, the system worked flawlessly, and I could probe the value of RAID in an analytical way.

These test numbers demonstrate perfectly why RAID is often worth having, irrespective of exactly how you deliver it. And the RAID offered with motherboards these days is the poor cousin of the hardware version it once was.

However, when I originally first did these types of benchmarks years ago, there wasn't any other way to get these levels of performance, and these days we have SSD drives. A single SSD can deliver the same level of performance as four fast conventional hard drives in a RAID 0 stripe, yet it's inherently more reliable and uses significantly less electrical power.

While I didn't throw any numbers up to support this, there isn't any reason why you can't use SSD drives in a RAID array, and the performance level, as you might expect, is astonishing. The only problems are that with drive size generally capped at



about 1TB, the arrays won't be that big, and the cost might be excessive for personal use.

For numerous reasons, SSD drives work better in RAID than physical hard drives, as they don't have a head move around and they don't suffer with fragmentation issues.

Personally, I'd generally dissuade people from using RAID 5 on software or BIOS configurations, because it can't be rebuilt while the system is running should a drive die. Downtime isn't good, so don't go there.

But the same drives organised with a hardware controller make for a good option, as you get some of the performance of stripes without the danger of trashing the pack, should one disk suddenly expire.

For those using computers at work, if you have a small server, then hardware RAID is the smart choice generally. I'd also consider it as a good means of providing resilience in a critical workstation, where downtime has major financial implications.

Also, while some software controllers offer 'hot spares', only the hardware controllers can bring these into use off their own bat, and return an array from being critical back to full operation unattended.

For home users, this is only worth considering if you have a collection of same-size unused drives sat around or you get a great deal on a set. Just don't come to me when you've converted your system to RAID 0 and then trash it entirely a few months later. You've been well warned. [mm](#)



Ways To Avoid Fixing Other People's PCs

Excuse us while we leave our morals at the door

1 Claiming Ignorance

Okay, it's going to be a bit difficult to persuade your friends and family that you don't know anything at all about PCs, because chances are you've already fixed theirs for them more than once. (And we all know what that means: you're their tech monkey for life.) But rather than pretending you don't know anything, wait until they describe their problem, then suck some air in between your teeth, shrug, and say something along the lines of "Sorry, that's a bit too advanced for me." If you're talking to them face to face, try to avoid looking at the inevitable disappointment in their eyes, otherwise there's a danger your conscience will make you backtrack, and you'll be up to your eyeballs in SATA cables and BIOS settings before you know it.

2 Fake Amnesia

Of course, there's one way to get away with claiming complete ignorance: you could suffer sudden and dramatic memory loss. "Your PC won't post? Post what? Sorry, who is this?" Yes, it's a somewhat drastic measure to take just to avoid a bit of computer maintenance, but not only will it give you back your free time, you'll also win plenty of sympathy for your plight. Just don't use the phrase 'fugue state' because then everyone will know you've been watching *Breaking Bad* and they won't believe you. And you'll still have to back up and reinstall Windows for them anyway.

3 Feign Injury

Although repairing PCs and software isn't a particularly strenuous activity, physically speaking, try doing it with a broken finger or a sprained wrist. It won't be easy. That makes it the perfect excuse for you to be unable to provide 24/7 seven technical support for your loved ones. All you need are a few bandages and maybe a couple of lolly sticks to make a convincing splint for your injured appendages. Be sure, though,

that you always keep the fake dressing on the same side, otherwise someone might notice it swapping over, and it won't be long before your day starts to resemble the plot of a bad sitcom.

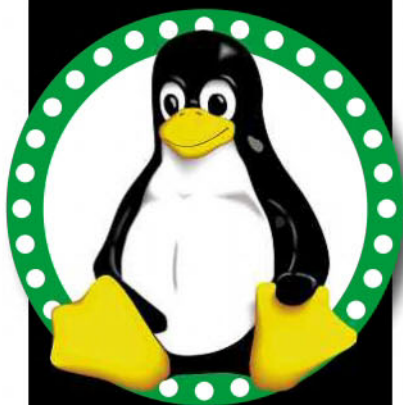
4 'Accidentally' Mess It Up

Just like telling people you can't fix something might persuade them to leave you alone for a bit, so too can telling them you can, but with complete and apparent overconfidence. They want you to change out their graphics card? Sure, you can do that. But while you're there, you might as well take out the motherboard and RAM, disconnect all the wires and drives, and generally make everything way better than it ever was. When you put it back together, don't reconnect the hard drive, but pretend to be stumped when it won't boot. Congratulations! You've now convinced your 'customer' that you have no idea what you're doing and that you've actually made things worse. They won't be back in a hurry.

5 Persuade Them To Buy A Tablet

Yes, it's still likely that you'll get a few calls about how to set up email on an iPad or Android, or questions about getting past the next level of *Candy Crush*, but they should find things easier. That means fewer things will go wrong, and you won't be called on quite so much to provide instant solutions. And if something does go wrong, then you can just remind them they'll be buying a replacement soon enough anyway. [mm](#)





ST Forever!

We dust off the Atari ST this week but resort to Linux to help us out

I recently dusted off my precious Atari 520ST from its allotted box in the loft. After carefully plugging it in and savouring the smell that can only accompany a 30-year-old computer, I applied power and discovered that the blessed thing had finally gone to meet its maker.

To be honest, I have no idea why it's not working. I've tried a couple of power supplies and professionally wiggled the cable in a fashion that's made to look like I know what I'm doing. If you ever wanted to see a grown man cry, then that was your chance.

However, not to be beaten by this foul-up, I decided to see what emulation possibilities are available for the ST under Linux. I've had a couple running with Windows, with mixed results, but I've yet to try them out on Linux. Anyway, I thought I'd give a selection a go and report how I got on with them.

Hatari

Hatari is easy to compile, build and eventually install. I decided to go for the latest release from the Hatari site, as opposed to the Software Centre version, which seemed to be a lesser version.

I've had problems in the past with loading up Codemaster's *Treasure Island Dizzy* on the ST

emulators I've previously used. On Hatari, though, running on my Ubuntu setup, it ran like a charm, with sound and graphics looking as spectacular as they did all those years ago.

Steem SSE 3.7.1

Steem is one of the most highly regarded Atari ST emulators available for Linux. Version 3.7.1, which was released

Unfortunately, I couldn't get STonX to work very well with my setup. I managed to get TOS up and running, but none of the games wanted to load up, which is unfortunate as I never really got into GFA.

ARAnyM

ARAnyM is somewhat different to the rest of the emulators in the list, in that it's not an

“ Hatari is easy to compile, build and eventually install ”

fairly recently, is near perfect to getting the best from our much loved machine.

A few titles worked without flaw, but I didn't manage to get *Pasti* working with it for STX files. Maybe I was doing something wrong, or perhaps that's something reserved for the Windows version.

STonX

STonX (ST on X Window) is an older project, but one that's still regarded as a good start for those who are after ST emulation on more limited hardware.

emulator but rather a virtual machine, like VirtualBox.

It basically runs the hardware and TOS from an Atari Falcon, so anything that ran on that original hardware should run within the ARAnyM environment.

Alas, I couldn't get it to run. For whatever reason, all I got was a blank screen. Admittedly I didn't have a lot of time to dedicate to looking into why it wasn't working, but I'm sure some of you clever Linux gurus out there could do it justice.

Better Than The Real Thing?

So is running an emulator of the Atari ST better than having the original machine in front of you? In my opinion, not a chance.

True the emulators are exceptionally well coded, but there's no soul. Compared to having the lovely beige-coloured machine at your fingertips, emulation just doesn't feel the same.



◀ *Getting the best from an emulated Atari ST with Hatari*

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

A-Eon Presses On

Sven Harvey takes a look at new developments

April saw a meeting of minds in the form of A-Eon technology, producer of the AmigaOne X-1000 and forthcoming AmigaOne X-5000 series, sitting down and talk shop with likeminded companies. Representatives of Ultra Varysis, which developed and manufactured the Nemo motherboard (for the X-1000) as well as currently being the developer of the Cyrus+ motherboard (set to be in the X-5000) discussed tech trends and strategy with A-Eon and ACube Systems of Italy, which produces the Sam motherboards and computers such as the AmigaOne 500, as well as bringing the open-source MiniMig project by Dennis van Weeren to users through their refined commercial standard production runs as the MiniMig v1.1.

The meeting resulted in a reinforcement of a strategic partnership between A-Eon and ACube, where the two companies have a unified roadmap to develop and produce both classic Amiga and AmigaOS 4.x hardware that is funded in partnership between the two companies, solidifying the future of the platform.

One of the first products of this partnership will be the MiniMig Plus, which further develops on from Dennis van Weeren's work. It is believed to include a Freescale Dragonball-Super-VZ processor, which is as fast as a 68030-processor at 30MHz, an ARM-chip, 32MB RAM (upgradable to 64MB), 8MB chip-RAM ('real' classic Amigas never went above 2MB), two USB-ports, network connection, a realtime clock, two SD card readers and 18-bit video. The FPGA is twice as big as the earlier MiniMig, and therefore should

accommodate AGA support. In short, it's the Amiga 1300 that never happened.

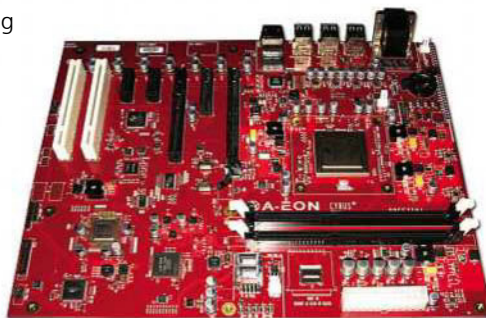
Furthermore, A-Eon should be shipping the DSP-based Prism Megamix hybrid card (for A1200 clockports and Zorro II slots) shortly, which will enable classic Amiga machines to support MP3 and other formats with little processor overhead.

A-Eon has also purchased the rights to the Ringhio OS messaging system, which it's now funding development of. This enables OS legal programs and apps to send alerts to the user's desktop, similar to a desktop information request but without the need for user interaction,

allowing the alert to be shown for a limited amount of time before closing – the kind of pop-up notifier that's taken for granted in Windows these days.

It seems slowing down isn't on the company's itinerary, let alone giving up during this 30th anniversary of the introduction of the Amiga platform!

▼ *The motherboard that will form the core of the AmigaOne X-5000*



Who Is A-Eon Technology?

Initially formed by Trevor Dickinson, A-Eon Technology is a British company now based officially in Cardiff, Wales.

A-Eon headed up the development of the AmigaOne X-1000 computer system, which features a motherboard commissioned by the firm and realised by Ministry of Defence contractor Varisys (now part of the Ultra Electronics group), a British company that creates motherboards for the armed forces.

A-Eon's managing director is also the head of AmigaKit, Matthew Leaman, and assumed the role after being involved with the X-1000 and AmigaKit distributing the system and later the Nemo motherboard from the X-1000 on its own.

With a vested interest in the development of the Amiga operating system and building further systems, the AmigaOne X-5000 series, with Amiga OS 4.2 being the target OS, A-Eon is ensuring the development of certain software for the platform, by purchasing the intellectual property and code to well-known programs for the current and classic machines.

In the last 18 months, A-Eon has taken over and invested in development of Image FX, Personal Paint, OctaMED, Aladdin 4D, as well as two Amiga community websites, while supporting other Amiga community ventures.

With Hyperion Entertainment (AmigaOS developers), Commodore and Amiga, Inc themselves seemingly relatively inert, one can only hope A-Eon Technology may become a binding force that brings them all together for good.



Sven Harvey has been our Amiga specialist for over 15 years drawing on his 24 years retailing computer and video games (25 Christmases, no less) and even longer writing about them.

Amiga



Ian McGurren is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Stick It To 'Em

Ian McGurren hopes he won't get burnt by Amazon's FireTV Stick

Last year, we reached peak media box. Every few weeks, there was a new tiny box of tricks capable of streaming HD video and TV, running apps and even playing games. Joining the Apple TV were more boxes from Roku, the NowTV from Sky, Google's Nexus Player and, arguably the biggest new player, the FireTV, from retail and now TV behemoth Amazon.

We also saw another side of the streaming market begin to emerge, the so-called 'Sticks' – small but powerful devices slightly larger than a traditional USB stick that plug directly into a TV or amplifier's HDMI socket. Traditionally, they contain a slightly cut down but still capable version of the chipset (here it's dual-core to the FireTV's quad), and they aim to supply much of their larger cousins' abilities for less money. Google's Chromecast has been the most successful of these thus far, but now it has a challenger in the shape of Amazon's FireTV Stick.

The device itself is much like any other stick, roughly the size of a cigarette lighter with a weight problem, with an HDMI plug at one end. It's well built, feels nice and isn't too heavy. In the middle there's a micro USB socket, but don't be fooled: this isn't for peripherals, this is for the extra power required by the unit. Trying to power it from a TV's USB port will result in it informing

you that there isn't enough power for the stick to function fully. Thankfully, though, there's a PSU supplied in the box.

In use, it's pretty much the same as the original FireTV unit. The user interface is exactly the same, based on Amazon's own fork of Android 4.2, and it's very easy to use. The UI leans heavily toward the Amazon Prime content offered by the company, and if you don't want to take advantage of that, it's a bit invasive.

Channel 5's respective services are there, but there's no ITV or All4, and certainly no NowTV.

But being an Android device, surely you can just install the missing ones by sideloading? Well, yes, and no. Yes, the FireTV Stick is indeed an Android device, and yes you can install to it via ADB or even apps like Apps2Fire (once this has been allowed in the settings), but it's not all that easy. Some apps won't even start, often due to needing Android 4.3 or above. Even if they do, many

“ In use, it's pretty much the same as the original FireTV unit ”

But why would you buy an Amazon media player stick if you don't live at least partly in the Amazon ecosystem? The apps is why, especially those that make the FireTV Stick a very capable home streaming player such as the evergreen favourite, Plex. In conjunction with a Plex server of your own it's one of the best, most intuitive and simple to use media playing setups about. There are also some of the requisite TV catchup services, although because you're limited to the Amazon app store, it's not as many as you'd expect. BBC and

then require touch or keyboard input, none of which the included remote is able to do. Syncing a keyboard is possible, via a hacked Settings.apk, but even then that is flaky. Mouse apps are also available, but none offer a built-in keyboard and they're less fun than the remote. Finally, sideloaded apps never appear in the list of available apps, instead requiring the user to run them from inside the settings menu. Realistically, that isn't ideal at all.

If you want a cheap smart TV device or a bargain Android stick, the FireTV probably isn't worth the hassle over a Roku stick or even one of the many Chinese Android sticks, even for the £25 it's popping up for these days. But for its intended use as a half-price alternative, half-powered alternative to the full FireTV, the FireTV stick fulfils what it offers: mostly the same experience, albeit it less smooth, for less money. If that is literally what you want, grab it; it's great for that.



Bench Press

Think benchmarking is straightforward? Think again...

When I heard about Intel's 18-core Xeon processor, my mind was drawn to testing it, which should be a straightforward process. After all, benchmarking is no more than running a test or preferably a battery of tests, and then noting the result. The result can then be compared to the results for other products of the same category to judge the performance of each. However, it's not always that simple.

Computers are complex machines, as are their individual components, and the modern computer's flexible and general-purpose nature means that a measure of performance may be applicable in one scenario but not another. Then there's the operating system to consider. Will you be using Windows, Linux or something else? Modern operating systems are also complex, and it's possible that they could have an effect on the performance of a benchmarking program.

Then the evaluator has to consider the way in which a machine or its components will be used, because a performance test will be appropriate for the way one person uses a computer but not another. If you use a PC to run a productivity suite such as MS Office and potter about on the internet, the fact that a computer scores highly for its 3D gaming ability will be of little importance compared to a test that focuses on processor and web performance.

It's also possible that a benchmarking utility doesn't take account of the effect an SSD has on a PC. Such a utility might test general processor, memory and graphics performance but not give any sense of the extra snappiness afforded by an ultra-fast SSD. For that reason, it's sometimes

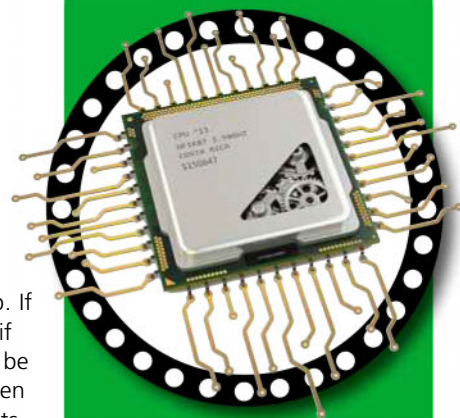
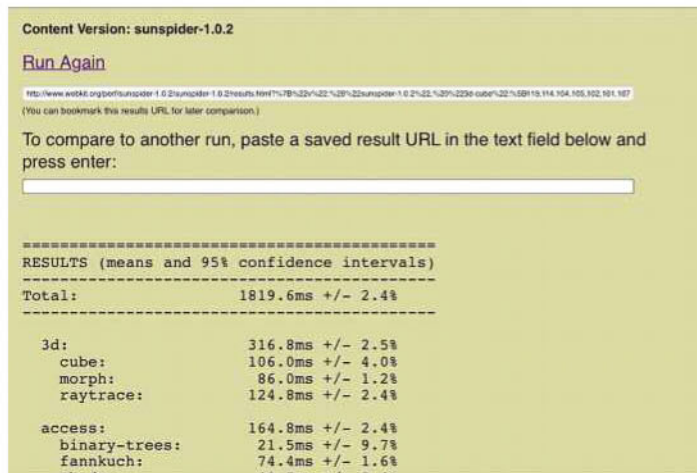
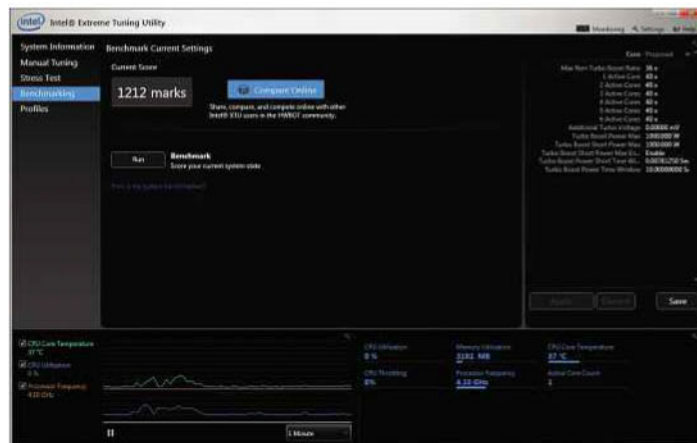
best to use multiple benchmarking utilities and suites to provide an account of a computer or component's performance.

This is necessary when comparing components that perform the same function but execute it differently. Take AMD's Kaveri chips and Intel's Core ix chips, for example. Both are CPUs, but Kaveri chips are optimised for handling OpenCL, as AMD was keen to point out at the range's launch. If a benchmarking tool doesn't test OpenCL performance, then a Kaveri chip would seemingly be placed at a disadvantage compared to the equivalent Intel Core ix chip. Of course, if you never use OpenCL applications, then such a test

may be appropriate and you may opt to buy the Intel chip. If you do use OpenCL apps or if you judge the Kaveri chip to be powerful enough anyway, then you might compare the results, decide the Kaveri chip is better value and then buy that for your next build.

There's a lot of choice when it comes to benchmarking tools, but as long as you use a set of utilities you'll be okay. I'll be bringing you further benchmarking info in a future edition of Micro Mart, so keep your eyes peeled.

▼ *There are benchmark utilities for everything, from testing web performance, as in SunSpider, or benchmarking a PC, as with Intel Extreme Tuning Utility*



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Gaming

Night Rider

Need For Speed is getting another reboot, with the next game focusing on open-world driving in an urban environment where the sun never rises...

This week, Ryan looks at the first teasers for *Need For Speed* and *Doom*, and looks ahead to a couple of vehicular combat games on the horizon...

Plug & Play

With E3 just around the corner, some of the biggest names in gaming are paving their way for a full reveal at the Los Angeles expo. First up, there's EA's *Need For Speed* – yet another reboot of its long-running series. The first teaser trailer (youtu.be/ybZ5nchDm6o) provides little more than a 30-second glimpse of cars hurtling around a benighted city – an early taste, we're told, of what will be an "urban car culture" racer that takes place entirely at night.

As its name implies, *Need For Speed* is yet another reboot for a franchise which has dabbled in all kinds of sub-genres over its 20-year history, from realistic driving simulation (2009's *Shift*) to free-to-play MMO (the soon-to-be-defunct *World*). Development duties are being handled by the Guildford-based studio Ghost Games, the team behind the well-received *Need For Speed: Rivals*, released in 2013.

"*Need for Speed* is one of the most iconic names in gaming, and we're returning it to greatness in this reboot," says executive producer Marcus Nilsson. "Pulling on our 20 years of history, and then taking a year out from releasing a game, we are making the game we've

always wanted to. We're listening to the fans and delivering an experience that will capture their imagination and unleash their passion for cars and speed."

While EA prepares to unleash its new *Need For Speed*, id Software has its own grand unveiling to make at E3. At about 15 seconds long, id's teaser trailer (youtu.be/bdAZqeDtlL4) for its long-awaited *Doom* sequel offers little more than a single shot: a revenant running along, discharging firearms and screaming. It's the work of a studio that knows, perhaps, that the mere mention of the *Doom* name is enough to get fans of the series in a lather. While we'll have to wait and see what id's sequel has to offer, footage of *Doom 4*'s earlier incarnation briefly appeared on the web – and it gives us an insight into a version of the game we'll never get to play. Set in an open city rather than the tight corridors of its predecessors, id's abandoned *Doom 4* concept looked like a major break from previous entries, even with its hell-on-earth premise. Footage of the game has since been pulled from the web, leaving *Doom* fans to ponder: why was development on this earlier version ceased,

and will its replacement, now simply called *Doom*, hew more closely to the previous games? We'll just have to wait and see.

Need For Speed and *Doom* are set to be unveiled at E3 on 15th June.

Online

Mad Max: Fury Road's reintroduced the franchise's brand of vehicular mayhem to a new generation of cinemagoers, and Avalanche Studios has its post-apocalyptic action game – simply called *Mad Max* – primed for release later this year. Perhaps spurred on by *Mad Max*'s return, there are a couple of other games with a similar premise on the horizon.

First up, there's *Dark Future: Blood Red States* – an adaptation of Games Workshop's tabletop games from the 1980s.

Set in a devastated future America, *Dark Future* is described by developer Auroch Digital as a "turn-based strategy game, played out in simultaneous real-time action". The player takes on the role of a bounty hunter who works for an entity called Sanctioned Ops – an agency that specialises in maintaining a semblance of order in the wasteland that exists between the gated communities of the



▲ The world may be ending in *Crossout*, but that doesn't stop players from building armoured vehicles and fighting to the death

rich and the ramshackle enclaves of the poor. Although further details about *Dark Future* are thin on the ground, it could provide a compelling mix of high-octane thrills and cerebral strategy.

Across a similarly bleak landscape comes *Crossout*, a collaboration between Gaijin Entertainment and Targem Games. This time, a mixture of alien invasion and genetic experimentation have left our planet a burned-out husk, and it's against this landscape that players do battle in armoured buggies and monster trucks bristling with weaponry.

"*Crossout* is about customisation, the freedom to construct the most destructive vehicles to wage war against your enemies", says Gaijin boss Anton Yudinsev. "Trading, earning or purchasing parts and

upgrades for vehicles, survivors can build the perfect fighting machine to their own preference, taking into account how each new addition affects the whole vehicle's performance".

Currently in the pre-alpha stage of development, *Crossout* will be a free-to-play MMO with revenue seemingly generated by some form of in-game auction, the details of which are currently scarce. Gaijin and Targem do, however, have some decent experience behind them; Gaijin created the (extremely good) World War II combat MMO *War Thunder*, while Targem's last credit was the real-time strategy game, *Planets Under Attack*, and in 2008, they made the car-based combat game, *GearGrinder*. If their collaboration can result in a bout of vehicular warfare on a par with *War Thunder*'s tanks-and-

planes combat experience, then *Crossout* could be well worth keeping an eye on.

Expect to hear more from *Crossout* at E3. Until then, you can sign up for beta access, scheduled to begin this summer, at crossout.net.

Incoming

If you can remember the 1992 platforming masterpiece *Flashback*, you'll probably be aware of just how good a game designer Paul Cuisset could be. With some of his other hits including *Future Wars*, *Cruise For A Corpse* and *Fade To Black*, Cuisset's games told engaging stories on a scale that, at the time, felt truly cinematic. Cuisset's latest title is *Subject 13*, which was successfully funded on Kickstarter last year and should be available to purchase by the time

you read this. Like Cuisset's earlier titles, *Subject 13* is an adventure game with a mystery at its core; you play a professor who wakes up in a mysterious science facility, and it's your job to help him escape – and, no doubt, figure out why he ended up there in the first place. Securing freedom will require solving a string of varied and tricky-looking puzzles, which range from manipulating dials and cubes to bouncing beams of light between angled mirrors, a little like Croteam's superb indie game *The Talos Principle*. Cuisset seems to be keeping much of *Subject 13* shrouded in secrecy (on Kickstarter, even the decidedly coy trailer came with a spoiler warning), but then, mysteries have always been a fun part of the designer's games.

Subject 13 is available on Steam now.



▲ *Flashback* and *Fade To Black* designer Paul Cuisset returns with *Subject 13*, an adventure-puzzler available on Steam now

AD INDEX

2/3 CCL	17 Box
6/7 Morgan	21 TP-Link
11 Incomedia	91 Sapphire
12/13 PC Specialist	92 Microdream

To advertise contact
Karl Taylor: +44 (0)20 7907 6706
Karl_Taylor@dennis.co.uk
or
Joe Teal: +44 (0)20 7907 6689
Joe_Teal@dennis.co.uk

NOTE TO ADVERTISERS

Micro Mart © Dennis Publishing, 30 Cleveland Street, London W1T 4JD. Company registered in England No 1138891. This publication may not be reproduced or transmitted in any form in whole or in part without the written consent of the publisher. Quotations for re-prints or other use of material are available on application.

THE BUSINESS ADVERTISEMENT DISCLOSURE ORDER 1977 (effective from 1st January 1978) requires all advertisements by people who seek to sell goods in the course of a business to make that fact clear. It is the responsibility of the advertiser to comply with the order. Lineage trade ads in Micro Mart carry this *T symbol. It is an offence for which you may be prosecuted not to advertise the fact that you are a trader.

MICRO MART is published weekly by Dennis Publishing. Subscriptions rates available on request. Micro Mart welcomes the submission of articles and reviews for publication. Please enclose a stamped self addressed envelope; otherwise the return of material cannot be guaranteed. Contributions accepted for publication by Dennis Publishing will be on an all-rights basis. Views or opinions expressed by freelance contributors are not necessarily those of Dennis Publishing. Advertisements and goods/services offered are the sole responsibility of the particular advertiser and Dennis Publishing cannot be held in any way responsible. Whilst every care is taken the publishers cannot be held legally responsible for any errors in articles or advertisements or any resulting unsatisfactory transactions. We will however investigate incidents on a written complaint. © Dennis Publishing 2006. This publication may not be reproduced in or transmitted in any form in whole or in part without the written consent of the publishers. ISSN 956-3881. Blimey.

'THE BEST BOOK EVER WRITTEN ON HOW TO GET RICH'

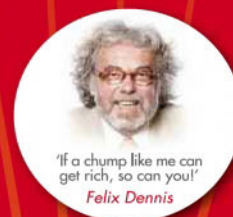
J. Disorobo, Amazon.com

This is a book about getting rich.

It's different from any other book on the subject because Felix Dennis made himself rich.

Very rich indeed.

And now he's going to show you how to do it!



THE CRITICS

'If this book doesn't get you rich, nothing ever will'

Mail on Sunday

'Well-founded advice based on hard-won experience'

Financial Times

'Full of honest insights. I strongly recommend this book'

Sunday Telegraph

THE READERS

'An inspirational book'

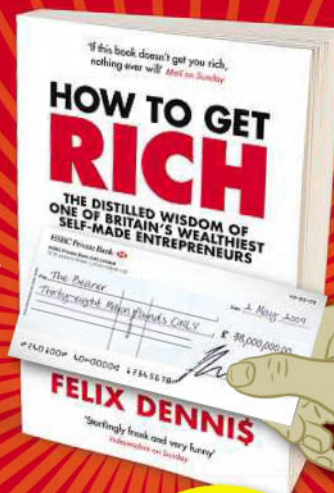
Alan Bates, Amazon.co.uk

'Essential reading. A great work'

Tom Rubythorn, Amazon.co.uk

'A true masterpiece'

'The Wanderer', Amazon.com



PAPERBACK EDITION OUT NOW £7.99

AVAILABLE NOW AT BORDERS® AND ALL GOOD BOOKSTORES



www.randomhouse.co.uk/howtogetrich
www.felixdennis.com

'WISE, FEARLESSLY FRANK AND TRULY INSPIRATIONAL'

Mail on Sunday

FREE Private Classified Adverts



ONLINE

Visit our website, register and submit your classified advert at www.micromart.co.uk
Your advert will not only appear in our magazine, but be live on our website too!



POST

Simply fill in the form & post to:

Emma Corbett, Micro Mart, 30 Cleveland Street, W1T 4JD

◀ **NEW ADDRESS!**

Step 1

Write the wording for your advert in the numbered boxes below (one word each box). Maximum 30 words free.
Please complete in BLOCK CAPITAL LETTERS, then proceed to Step 2

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50
51	52	53	54	55
56	57	58	59	60

30 Words FREE Private Ads Only Trade ads MUST be boxed or reversed	Boxed		Reversed	
	Private	Trade	Private	Trade
	£6.80	£13.60	£8.00	£16.00
£1.70	£8.50	£17.00	£9.70	£19.40
£3.40	£10.20	£20.40	£11.40	£22.80
£5.10	£11.90	£23.80	£13.10	£26.20
£6.80	£13.60	£27.20	£14.80	£29.60
£8.50	£15.30	£30.60	£16.50	£33.00
£10.20	£17.00	£34.00	£18.20	£36.40

Step 2

Choose a category you would like your advert to appear in and tick the box.

- ☐ Hardware for sale ☐ Software for sale ☐ General for sale ☐ Accessories
☐ Hardware wanted ☐ Software wanted ☐ General wanted

Step 3

Complete all fields of your personal details and payment method.

Name

Address

Post Code

Landline Telephone No. Email

If I have more than 30 words, I have enclosed due payment. I am not advertising pirated, pornographic or any other kind of illegal software and my advert is both honest and legitimate. MM reserves the right to refuse or alter adverts at the discretion of the management. MM cannot be held responsible for the condition or quality of goods advertised. Your advert will be processed on receipt and will appear a.s.a.p. subject to space and availability.

Please tick appropriately ☐ Private ☐ Trade

I enclose payment by ☐ Cheque ☐ Postal order

or please Debit my Mastercard/Visa/Amex account No

Expiry Date:

Authorise payment for £



FAX this completed form to: 0207 907 6066

Please Note: The standard Micro Mart conditions of advertising acceptance apply to all classified advertisements. Cancellations and amendments are not accepted to free ads. The publishers may refuse any advertisements and cannot guarantee insertion into any specific issue. Dennis Publishing will use your information for administration and analysis. We may share your information with carefully selected 3rd parties. We, or they, may send you details of other goods or services which may be of interest to you. The information may be provided by letter, telephone or other reasonable means of communication. If you do not want your details to be shared with carefully selected 3rd parties, please tick here. ☐

IT

Essentials

TO ADVERTISE CALL

KARL TAYLOR
0207 907 6706
karl_taylor@dennis.co.uk
or JOE TEAL
0207 907 6689
joe_teal@dennis.co.uk

FILCO

The best keyboards in the world.

Available from
www.keyboardco.com
0845 205 5555

Today's news
today, not a
week later

- Breaking IT news
- News that matters to UK IT decision makers
- Updated throughout the day



IT news as it happens, online now at
www.itpro.co.uk

www.bit-tech.net

THE LEADING DESTINATION FOR PC ENTHUSIASTS & Hardcore GAMERS

bit-tech.net

Amber

Transforming young lives



Amber transforms lives by offering a fresh start to unemployed, homeless young people seeking direction in life.

Amber builds confidence, motivation and self-belief.

Amber works



To donate text AMBR03 to 70070 and the amount
or go to www.amberweb.org

Registered charity number 1051388

To place an ad in our classifieds, simply fill in the form at www.micromart.co.uk or send your ad by post to Maaya Mistry, Micro Mart, Dennis Publishing, 30 Cleveland Street, W1T 4JD

HARDWARE FOR SALE

Have you got any old kit lying around you'd like to get rid of? Fancy making a few pounds while you're at it? Why not advertise in the Micro Mart classifieds? It's easy and it's free, just email what you've got, how much you'd like for it, and your contact details to micromartclassifieds@gmail.com, and we'll do the rest. There are thousands of readers out there looking for components every week, and you may have something unwanted they've been searching for – so get in touch and save your kit from going to the tip!

KINGSTON 120GB SOLID STATE HARD DRIVE. For sale 120GB Kingston solid state hard drive model SSDnow V300 2.5" Sata3 - compatible with Sata2. Very fast drive. Perfect condition. Free delivery. PayPal accepted. Price £38.
Email: geofry@tiscali.co.uk

Laptop for sale. Dell Latitude E5420 i5 2.5 ghz, 4GB RAM, 500GB hard drive, DVDRW, built in camera. Genuine Windows 7 64 bit professional. Only £150 plus £12 for next day delivery. Payment via Paypal or cheque or bank transfer, cash. Fantastic condition very fast.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Laptop for sale. HP NC 6400 Core 2 DUO 2.0mhz 3gb ram 80gb hard drive DVDCDRW Fingerprint reader fantastic and fast. Genuine Windows 7 35 bit professional. Only £60 plus £12 for next day delivery. Fantastic condition very fast.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Laptop for sale. HP Compaq 6910p Core 2 DUO T7300 2.0mhz 3gb ram 80gb hard drive DVDCDRW Fingerprint reader fantastic and fast. Genuine win 7 35 bit professional Only £60 plus £12 for next day delivery. Fantastic condition, very fast.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

HP 88 Inkjet Cartridges eight time expired boxed HP cartridges £5
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

WD 500GB external USB Hard Drive. Excellent Condition. £20 include P&P.
Tel: Michael Cunnane (01452) 303732

WD 3TB internal Hard Drive. Excellent Condition, £65 include P&P.
Tel: Michael Cunnane (01452) 303732

WD Internal SATA 3.5" 2TB Hard Drive. Excellent Condition. £37.50 included P&P.
Tel: Michael Cunnane (01452) 303732

Flat screen monitors. Mainly 15" £20+p&p and 17" £30+p&p but have others on request. When packing I will make sure they have lot of padding to reduce risk of damage. Please email or call me for more information.
Tel: David (01616) 888119
Email: pcmadnessltd@yahoo.co.uk

IBM Thinkpad T30 laptop for spares or repairs. Excellent condition, but does not bootup. Not sure why. Could be an easy fix or for parts/spares. £15 plus P&P.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Webcam (Trust Spacecam). Boxed with CD of installation software and instruction manual. Perfect condition. £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

HP Photosmart C4585 All-in-One multifunction colour printer. Perfect condition. Includes software and manual. £20.00
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Laptop Hard Disk Drive. Fujitsu. 20GB. Excellent condition: £10.00.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

PC Desktop Ram (DIMM) Memory. Siemens PC100 - 222- 620 16M x 64 SDRAM. HYS64V16222GU-8 Only £8.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

PC Desktop Ram (DIMM) Memory. 64MB Siemens PC100-322-620 MT8LSDT864AG-10CZ5 - Only £8.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Western Digital Cavier SE Desktop Hard Disk Drive 160GB. Perfect condition. Only £10
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

CD Optical Drive for installation in desktop PC Only £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Very rare Viking IBM 16MB Dram Card (15109 66G5109) for Compaq, IBM Thinkpad, Etc Laptop Only £20
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

TP-Link 54Mbps 4 port Wireless G Router. Perfect condition and boxed. Model: TL-WR340G. £20.00 plus postage.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

US Robotics External 56K Message Modem. Includes V.90 56K Standard X2 Technology. Boxed and complete. Perfect condition. £25 +

p&p.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Addon Wireless LAN USB 2.0 54Mbps 802.11g Adaptor. Boxed with instructions and software: £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

56kb Fax Modem External. Only £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

DIR-615 Wireless N Router. Boxed, brand new. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Lexmark Portable Photo Printer P315 model. Brand new, boxed and unused. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Netgear DG834N Rangemax Next Wireless N Modem Router kit. Excellent condition complete with power supply, network cables, telephone cable, ADSL filter and setup CD. £10.00.
Tel: David Ewles (01295) 253554
Email: david@ewles.gb.com

Laptop for sale. Toshiba Portage i5 2.5ghz Model R830-13c 4gb memory, 320gb hard drive. Wi-Fi, fingerprint scanner, HDMI output. Sold on eBay for over £200; only £150 plus £15 p&p. Absolute bargain. Great condition. Very light.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

ASUS P5QL-EPU Motherboard - 775 Socket - DDR2. Tested and removed from a working environment, comes with I/O Plate. £45 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

XFX GeForce Nvidia 8800Gts Graphics Card for Sale. £40.00 +

Post/Packing. Perfect working order.
Email: Ken Toole
ken.toole1@virginmedia.com

ASUS P5B Motherboard - 775
Socket - DDR2. Tested and removed
from a working environment,
comes with I/O Plate. £35 inc Free
Courier. Payment via PayPal.
Email: info@jmcomputing.info

Kingston HyperX 2x2GB
DDR2 1066MHz RAM. Tested
and removed from a working
environment. £45 inc Free Courier.
Payment via PayPal.
Email: info@jmcomputing.info

Intel Core 2 Duo E4600 3GHz
775 Socket Processor. Tested
and removed from a working
environment. £10 inc Free Courier.
Payment via PayPal.
Email: info@jmcomputing.info

Seagate Barraucda 250GB
SATA Hard Drive 3.5". Tested
and removed from a working
environment.
£12 inc Free Courier. Payment via
PayPal.
Email: info@jmcomputing.info

LAPTOP HARD DRIVE. 160GB
SATA 2.5". WESTERN DIGITAL.
Model: WD1600BEVT. Fully tested.
Perfect working order. Partitioned
and formatted NTFS. Free postage.
Price £22. Paypal accepted.
Email: geofry@tiscali.co.uk

DESKTOP HARD DRIVE. 640GB
Western Digital 3.5" SATA model
WD6400AAKS. Perfect working
order. Partitioned and formatted.
Only used as back-up drive. Free
delivery. Price: £33. PayPal accepted.
Email: geofry@tiscali.co.uk

HP Microserver n40l / windows 7
Pro / 4Gb memory / 400 Gb drive
/ MS Office 2003. This HP n40l
Microserver is in excellent condition
and comes with Windows 7 re-
allocated, activated, & completely
updated Feb 2015. Also installed
is Minitools Partition Magic, MS
Office 2003 HP basic, with codes/
coas. Buyer may have Linux
Mint instead of Windows 7, or a
completely bare drive. 2 spare drive
frames. I have the original packing

as per HP original delivery. So far as
I can see, this Microserver will take
16Gb memory and up to five hard
drives. See it working before buying,
(by arrangement). No refund
under any circumstances. Collect
from Harrogate, North Yorkshire.
£140. Cash on collection. Delivery
might cost £8 via Hermes, maybe
much more to Highlands/ Islands.
Payment by Cheque O.K subject to
clearing, Paypal at £25 additional.(to
cover their fees).
Tel: (07794) 528857
Email: it_central@ntlworld.com

Vintage Amstrad PC1512 HD20.
Colour Monitor 20MB Hard Drive
5.25 Floppy Original Amstrad
Disks Manuals spare Keyboard
and Mouse. This is a rare fully
functioning collectable. £60.
Tel: (01949) 876235
Email: hc4203@gmail.com

For sale SKY PLUS and SKY PLUS
HD REMOTES. Original £7.50
+ P&P please email or call me for
more information.
Tel: David (01616) 888119
Email: pcmadnessltd@yahoo.co.uk

Corsair Vengeance 16GB
(2x8) DDR3 Memory
CMSX16GX3M2A1600C10. Never
used but box opened. Selling due to
wrong voltage, these are 1.5V and
I needed 1.35V. Asking £85.00 inc.
postage to the UK.
Email: fabstock1@gmail.com

Used Asus Wireless Router for sale.
Dual-band 4 x GB Ethernet Wi-Fi
RT-N66U N-900. £65.00 O.V.N.O.
Selling cause I have no need for it
since upgrade to BT Home Hub 5.
Email: beme12355@googlemail.com

Asus A8V motherboard, socket 939.
Clips holding CPU cooler broke,
CPU overheated & shut down. M/B
should be OK and there is 4GB of
ram on board. Free, collect only.
North Wales.
Tel: (01286) 678584
Email: gw7hav@googlemail.com

2 x 2GB DDR3 1600 Mhz RAM.
Recently taken from a 2012 mac
mini. As new £25.
Email: amstereofan@gmail.com

Custom Built modified watercooled
gaming desktop. i5 4670K, R9 280X,
Silverstone RV-01 USB3, 1000w
PSU: parachord sleeving, Z87M
OC Formula, 8GB Kingston Fury
1866MHz, 180mm and 120mm
Radiator. Numerous mods, Yellow
and Black colour scheme! No
Storage. Email for pictures and info.
Buyer collect: Gloucestershire. £800
ono.
Tel: Adam (07426) 874117
Email: flaming_monkey95@hotmail.
co.uk

4X1 Gig DDR2 Ram (Ocz Nvidia
SLI PC2 6400 epp 4-4-4-15) for
sale. £40.00 for all 4 + Post/Packing.
Perfect working order.
Email: Ken Toole
ken.toole1@virginmedia.com

CPU sale. Intel Core 2 Duo E4400
2.0Ghz £10, Intel Pentium 4 630
3.0Ghz £7, Intel Celeron M 350
1.3Ghz £5,
Intel Celeron Mobile Dual core
T1500 1.866Ghz £6, Intel Pentium
4 630 HT 3.0Ghz 2Mb cache £8,
AMD Athlon 64 3200 £5 Athlon 64
3500 £6 Athlon 64 3200 Dual core
£10 postage £2.
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

Laptop DDR2 memory sale. 2
Corsair Value Select 533mhz 1GB
£18 pair, 2 Hynix 800mhz 2GB £26
pair, 2 Generic 533mhz 1GB £15
pair, 1 Generic 800mhz 1GB £10, 1
Nanua 666mhz 1GB £, 1 Samsung
666mhz 1GB £8. Postage included
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

DDR2 memory sale. 2 x Nanua
PC2 3700 256MB £6 pair, 2 x HP
PC2 4200 256MB £7 pair, 4 x HP
PC2 4200 512MB £10 pair or £18
for four.
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

Asus M2N2-SLI Deluxe
motherboard bundle. With AMD
Athlon 64 4000 CPU, 4Gb Corsair
ram, fan, backplate, manual, driver
CD. £40
Email: david.white38@ntlworld.com
IBM / LENOVO SFF BASEUNIT.
P4 / 2.8 H-T, 2.0 gigs ram, 40 gig
Hard Drive, CD-Rom, 10/100

Network, sound, USB, Clean install
XP-pro, fully updated, Office Suite,
Anti-Virus, & all usual utilities,
COA Licence Sticker & Install
media, £25
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

FUJITSU-SIEMENS
MINITOWER. Pentium D 2.8
Dual-Core, 2.0 gigs Ram, 80 gig
Hard Drive, DVD-RW, Gigabit
network, sound, Clean Install
XP-pro, fully updated, Office suite,
Anti-Virus & all usual Utilities,
Legal COA sticker & System Image.
£35
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

DELL OPTIPLEX GX240 SFF. P4 /
1.6, 20 gig hard Drive, 768mb ram,
CD-Rom, 10 / 100 network, Sound,
Front USB, , Clean install XP-pro,
fully updated, Works OK but slow
by modern standards, £15.
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

LG Flatron W2246S 22" monitor.
Includes power and VGA leads. No
dead pixels in very good condition.
£50 Buyer Collects from Verwood
Dorset.
Tel: (01202) 826057
Email: geoffandcynth@themailspot.
com

2 x 512MB PC3200 DDR400. These
two sticks were removed from my
working system, now redundant. £5,
plus £1 p&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk
2 x 1GB PC2100-648. These two
matched sticks were removed from
one of my redundant systems. Plus
one PC2700 (DDR 333Mhz) and
one 512Mb PC3200 DDR400 stick.
All for £5 plus £2 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk.

SANSUNG GALAXY Tab 3 for sale.
2mths old, 8gb, wifi, £80 open to
offers. Willing to post at a charge.
Tel: Christine (01386) 831836

HP Elitebook 8760w i7 2820QM @
2.2ghz 32GB RAM 750GB HDD
Quadro 4000M GPU. Only 2 small
marks on whole machine. Cost

£3500 when new. £900 ONO
Tel: (07772) 926632
Email: stedaley19@gmail.com

WD 2TB desktop hard disk.
Formatted ready for an operations
system. Runs very nicely. New
laptop means my desktop items
must all go! £40 includes free
tracked postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Asus P8Z68-v LX socket 1155
motherboard. Original box 1/0
cover user guide driver disk fitted
core i3 2100 CPU 3-1GHz and 8GB
PC1300 memory. No fan. Working
fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Asus p8h61-mle motherboard
socket 1155. Original box 1/0 cover
driver disk manual together with
Celeron 91620 dual core CPU and
4 9195 pc1300 memory. Working
fine. No fan. £70 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba Satellite SA60 laptop. Model
PSA60E-092058EN. Windows XP
Home Edition with Certificate of
Authenticity. For spares or repair -
broken power connector on mobo.
No power cord. Otherwise very
good condition.
£40.00 + p&p
Tel: Peter Scarth (01452) 372350
Email: pscarth@blueyonder.co.uk

SoundBlaster Audigy SE 7.1
soundcard for sale. Perfect working
order. Selling due to not being
needed any more. Just £12 plus
postage.
Tel: Ian (01132) 629028
Email: ianmatthewuk@yahoo.co.uk

Toshiba C500D-B-11 laptop.
Virtually new cost £279 will accept
£150 O.N.O.
Tel: (01217) 535324

Apple Touch 32 GB iPod. Virtually
new cost £199 will accept £100
O.N.O.
Tel: (01217) 535324

400GB IDE drive 3.5 inch formatted
ready for use. Only £20 plus £3

for p&p. I can load genuine XP
Professional from Microsoft with
genuine certificate of authenticity
for an extra £10. Refurbished.
Tel: Dave Thomas (07828) 982930 or
(01942) 706571
Email: davethomas96@aol.com

Amstrad PCW 9256 in good
working condition with software.
Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net
CRUCIAL 8GB (4x2). PC3-10600
unbuff. CT25664BA1339A. (4X2) =
£48.00. (2X2) = £25.00. Boxed kit of
CORSAIR Vengeance 4GB (2X2) =
£35.00. Prices include P&P.
Tel: Bob Williams (01507) 602914
Email: flipinek@hotmail.co.uk

EPSON PRINTERS T715 12
multipack F.O.C. to good home,
just pay postage £2.50. (Tesco
equivalent
original cartridges £120 current
special offer!) Perfect crisp printing
etc.
Tel: Pete Dew: (07526) 988594

EPSON PRINTERS T481-T486 6
multipack F.O.C. to good home,
just pay postage £2. Perfect crisp
printing etc.
Tel: Pete Dew (07526) 988594

EPSON PRINTERS T711 6
multipack F.O.C., just pay postage
£2. Perfect crisp printing etc. May
have others F.O.C. if model older
than 12 months.
Tel: Pete Dew (07526) 988594

Intel 3930K processor. Used, but not
overclocked. No box or fan. £220
ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Apple Mac G4 Tower. 400MHZ
cpu, 640MB Ram, 2xHardDrive
40GB,20GB. DVD & ZIP Drive.
OS X v10.3 Panther+OS9. NO
KEYBOARD OR MOUSE. £25 ono
Buyer collects
Tel: (07941) 254296
Email: jasonnd@hotmail.com

Wireless Motorised IP Surveillance
Camera. White In Colour - Control
from your mobile phone / tablet /
pc when out of the home - ideal for

home security , baby monitoring,
has sound and remote recording
etc Brand new in Box - £25 Price
includes post and packing.
Email:omendata@gmail.com

Blueberry I-MAC. Good condition,
all in working order, £55.
Tel: (01386) 832758

PRINTER CARTRIDGES.
Suitable for Epson printers range
T711 - T714. Work perfectly. 50
pence each, plus postage (brand
new unused sealed). Over a dozen
available.
Tel: (07541) 222678
Email:petedew@gmx.co.uk

Panasonic KX-P7105 mono laser
duplex printer. Some toner left.
Up to Windows XP only - hence
£25. Buyer collects from N2, East
Finchley
Tel: (02083) 431527
Email: prnikiel@gmail.com

INKJET CARTRIDGES suitable for
Epson Printers T711 - T714 range,
and T481 - T486 range. 79 pence
each, plus postage. Work perfectly,
good crisp printing quality.
Tel: (07526) 988594
Email: petedew@gmx.co.uk

Powered PCI Express x1 To x16
Riser Card Extension via USB 3.0 +
Power Cable Adaptor. Allows you
to add an extra Pci-ExpressX16 slot
to your Pc converting an existing x1
slot to x16. Useful for adding an
Extra graphics card to create a
Crossfire triple configuration or
for Bitcoin data mining up to 7
cards can be installed using these
adaptors. Quality model - Brand
new still boxed. £10. Price includes
p&p.
Email:omendata@gmail.com

Amstrad PCW 9256. In perfect
working order including on-top
printer with a few 3" disks. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

2 HP Laserjet 3100 printer-fax-
copier-scanners. In good working
order. £25 each.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Lian Li PC-X2000 Computer Case.
Supports mATX, ATX, eATX; hot
swap SATA drives, six 3.5" & two
2.5"
hot swap disc holders. Three
140mm intake plus two 80mm and
one 140mm exhaust fans. £140.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

1.5tb SATA drive. Fully refurbished
by government acknowledged
company. All data taken off (some
drives are still under Western
Digital warranty) ONLY £40
including P & P
Tel: Dave Thomas (01942) 706572
Email: davethomas96@aol.com

1tb SATA drive. Fully refurbished
by government acknowledged
company. All data taken off (some
drives are still under Western
Digital warranty) ONLY £38
including P & P
Tel: Dave Thomas (01942) 706572
Email: davethomas96@aol.com

2tb Western Digital SATA drive.
Model WD2002FYPS 64mb cache,
fully refurbished by government
acknowledged company. All data
taken off (some drives are still under
Western Digital warranty) ONLY
£50 including P & P
Tel: Dave Thomas (01942) 706572
Email: davethomas96@aol.com

GEFORCE 1 GBYTE 24- PCI
express PC card. HDMI DVI VGA
PC video card. £10 plus p&p £4.50.
2 for sale. £10 each.
Tel: (01707) 339063
Email: awhishaw@aol.com

HARDWARE WANTED

**Trying to breathe life back
into an old machine? Why
not submit a wanted ad and
see if any of the thousands of
computer enthusiasts who read
the magazine each week have
what you're looking for?**

WANTED: Fractal Design Define
XL full tower case. R1 (original
version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

WANTED: Bluetooth dongle and driver for Philips Crystal 650.
Tel: (01994) 231112
Email: alancox2823@gmail.com

WANTED: Working Dot Matrix Printer in Good Condition.
Thanks!
Email: printer.20.odayly@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhviland73@gmail.com

WANTED: Corsair PSU cable bag. Please email me if you can.
Email: Paul@planetvoodoo.co.uk

SOFTWARE FOR SALE

Do you have any old software that you simply don't use? Why not advertise is with us and see if anyone else can make use of it – you may well be surprised to find that someone is looking for exactly what you don't need!

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50
Tel: [Ian \(01932\) 856971](tel:01932856971)
Email: a2345@btinternet.com

PCB design software. 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99
Tel: [Nigel Wright \(07967\) 527693](tel:07967527693)
Email: cresswellavenue@talktalk.net

Microsoft Office 2013. Original Software only £100.
Tel: [Gordon \(01314\) 660205](tel:01314660205)
E-mail: scobie09@gmail.com

Sim City 2000. Boxed and original. Classic gaming. £15.
Tel: [Gordon \(01314\) 660205](tel:01314660205)
E-mail: scobie09@gmail.com

Windows 7 Ultimate 32 bit version . NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £ 45 including P & P,
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

Windows 2000 Professional. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £15 including P & P.
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

Windows Vista Business. New and sealed. software and license (certificate of authenticity) 100% genuine and unopened. (Dell branded but will install on any machine) ONLY £15 including P & P
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

Windows 7 Home Premium 32 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £35 including P & P.
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
Tel: [Ian \(01932\) 856971](tel:01932856971)
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR Runs under Windows 8, 7, Vista or XP, Original CD with unused product key £25.
Tel: [Ian \(01932\) 856971](tel:01932856971)
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: [Ian \(01932\) 856971](tel:01932856971)
Email: a2345@btinternet.com

Windows 7 ULTIMATE 32 Bit and 64Bit DVD disks incl. SP1 This is my "Get Genuine Kit" from Microsoft not OEM. New install or legalise your copy with full Product Key. only £50 incl. reg. post
Email: Dave ochdgh@aol.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused

product key £15.
Tel: [Ian \(01932\) 856971](tel:01932856971)
Email: a2345@btinternet.com

Microsoft Office 97 Professional. Original disc with key £18 inc postage.
Tel: [Andrew \(01376\) 512118](tel:01376512118)

Windows XP Professional. New and sealed. Book, software and license (certificate of authenticity) 100% genuine and unopened. (Dell branded but will install on any machine) ONLY £15 including P&P.
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

Microsoft Office Small Business Edition 2003 with Business Contacts. Legitimate Office Small Office Business Edition comprising Word, Excel, Powerpoint, etc. Comes with small piece of OEM hardware and original license code (coa) £10 incl. delivery, cheque or PO. £10.50 by Paypal.
Tel: [\(07794\) 528857](tel:07794528857)
Email: it_central@ntlworld.com

Windows 8 Professional 64 bit. NEW software HP branded. 100% genuine and unopened software. ONLY £15 including P & P.
Tel: [Dave Thomas \(07828\) 982930 or \(01942\) 706571](tel:07828982930)
Email: davethomas96@aol.com

SOFTWARE WANTED

Wanted: I have a BCL 2.4g Wireless Gaming Mouse, Model: RF0P77 (3v 7ma) but no Drivers. Can someone help with a copy of the Original Drivers for this Wireless Mouse please!
Email: Cliff Evans cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba L30-11D PSL33E laptop. Laptop useless without drivers but only worth £40, so cannot pay a lot.
Tel: [John Udall \(01384\) 824494](tel:01384824494) Email: john.udall@blueyonder.co.uk

Wanted: Windows XP SP2 or Windows 7. I am also looking for a boot disc for Toshiba satellite L40-18Z.
Tel: [Mr Cranney \(07948\) 927384](tel:07948927384)
Email: mcrnny1932@gmail.com

IMPORTANT BUYING ADVICE

We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:

- **Never - NEVER** - pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.
- Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk
- Keep copies of all correspondence
- When sending out goods, at the least obtain a certificate of posting from the Post Office

If you are in any doubt, feel free to send us a mail via editorial@micromart.co.uk.

Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it.

Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

ASK AARON



Meet Aaron Birch. He's here to help you with any general upgrading, software and system building problems. He's got advice aplenty, and you're very much welcome to it!

Send your questions to:
Aaron Birch
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Router For Two?

I've moved from my old ISP following a house move but have taken my old router, which I purchased as part of the deal with my old supplier. When I moved to my new home, I was keen to get online ASAP, so I arranged for my new connection to be established right away. Due to the expensive cost of a new router, even one supplied by the new ISP, I decided to use my existing one.

On moving into the property, I quickly set about getting online and connected my router. I'd received a notification that my new services was up and running, so I thought this would be no problem. That's not the case, as I cannot get online at all. It would appear as though the router has no actual connection to the outside world, despite being perfectly fine previously.

I've not changed the settings on the router, as I didn't want to mess around with my wi-fi, as so many devices are connected to it. I'm not totally in command of my abilities when it comes to the technical side, so can't say for sure, but after logging into the router's admin page, I believe that it's telling me that no ADSL is connected.

How is this possible? My ISP has said the service is live and ready to go, and I know this router works, as I was using it only a day before I moved.

I'm sure this is a mountain I've made out of a mole hill, but I'd appreciate your input. I've called the support for my ISP, but they've not been all that helpful, and an engineer can't come out to see me for a month! Please help.

Leslie

Unfortunately, Leslie, you haven't specified your ISP names or the router you're using, but I should still be able to provide some assistance. When you move from one ISP to another, your router will usually be fine, as most are made using existing router hardware and are simply branded as an ISP's model. This is not the case all of the time, but in my

experience it's more often than not true.

You say you haven't changed any settings for your router, and this would be the first, easy thing to check before we move on to more in-depth things, as well as your physical phone line.

Although you can plug your existing router in, leaving your wi-fi settings intact for the most part, you will still need to update your username and password for your new ISP. Currently, if you haven't changed it, your router will have the login and security for your old service provider, which will get you nowhere.

When you signed up for the new ISP you will have been given a username and password. Usernames are often email addresses (from the new ISP), and passwords could have been chosen by you or be randomly generated default codes. You need to find these and log into your router to update this info. If you do this, you may have more luck and should be able to connect without further issue. The problem could lie elsewhere, however.

As you say your router is not getting any form of ADSL connection or signal, this would point towards the phone line to your house not being connected or activated, as a signal should be received, even if you're not connected to the ISP. Have you tried a normal phone handset in

the phone socket to check for a dial tone? Do the lights on your router signify that ADSL Sync has been achieved? If not and you have no dial tone, there's little you can do but wait for an engineer to visit, so they can inspect the phone line and connect it if needs be.

Other things you may want to check, although they're unlikely to make much of a difference, would be to perform a factory reset of your router or even update the firmware. If settings that have changed since it was at its factory default are causing problems, this could help, and new firmware is often a good idea when it comes to troubleshooting. Of course, this would need an internet connection, so you'd need to use a friend or family member's internet if you haven't got any other option.

From the information you've supplied, though, I'm almost certain you have no active phone line, which means a long wait for the engineer. In the meantime, you could contact your ISP and ask for some assistance. Some ISPs may supply interim 3G or 4G devices to get you online. You can also use your existing mobile phone as a hotspot too. Good luck.

▼ **Most, but not all ISP routers can be used with other suppliers**



Lost, And Found

My laptop was recently stolen while I was out in London (from a cafe where I left it alone to go to the toilet, rather stupidly). Luckily, the cafe owner noticed this and gave police a good description, CCTV access or whatever else, and my laptop was actually recovered. Hurrah!

Now I have a dilemma. Basically, my laptop looks normal, and it's passworded, both in Windows and in the BIOS, so I don't think the thief got onto it, but as it was gone for about a week, I can't be sure. I've logged into it, without hooking it up to a network, and all seems okay. I just can't help but be a little paranoid about using it as normal.

What would you do? Am I overreacting, and is it a good idea to just carry on using it, or am I right in being cautious?

Ste

I wouldn't say you're overreacting at all here, Ste. Any sort of theft will make you cautious or paranoid, it's only natural, and when it comes to PCs, which can hold and process a lot of sensitive data, it's hard not to be worried.

You could check such things as the system log or file access date stamps to see if anyone has used the laptop. Simply go to Computer Management and look through the various Windows logs. Windows keeps these automatically, and if no one has used

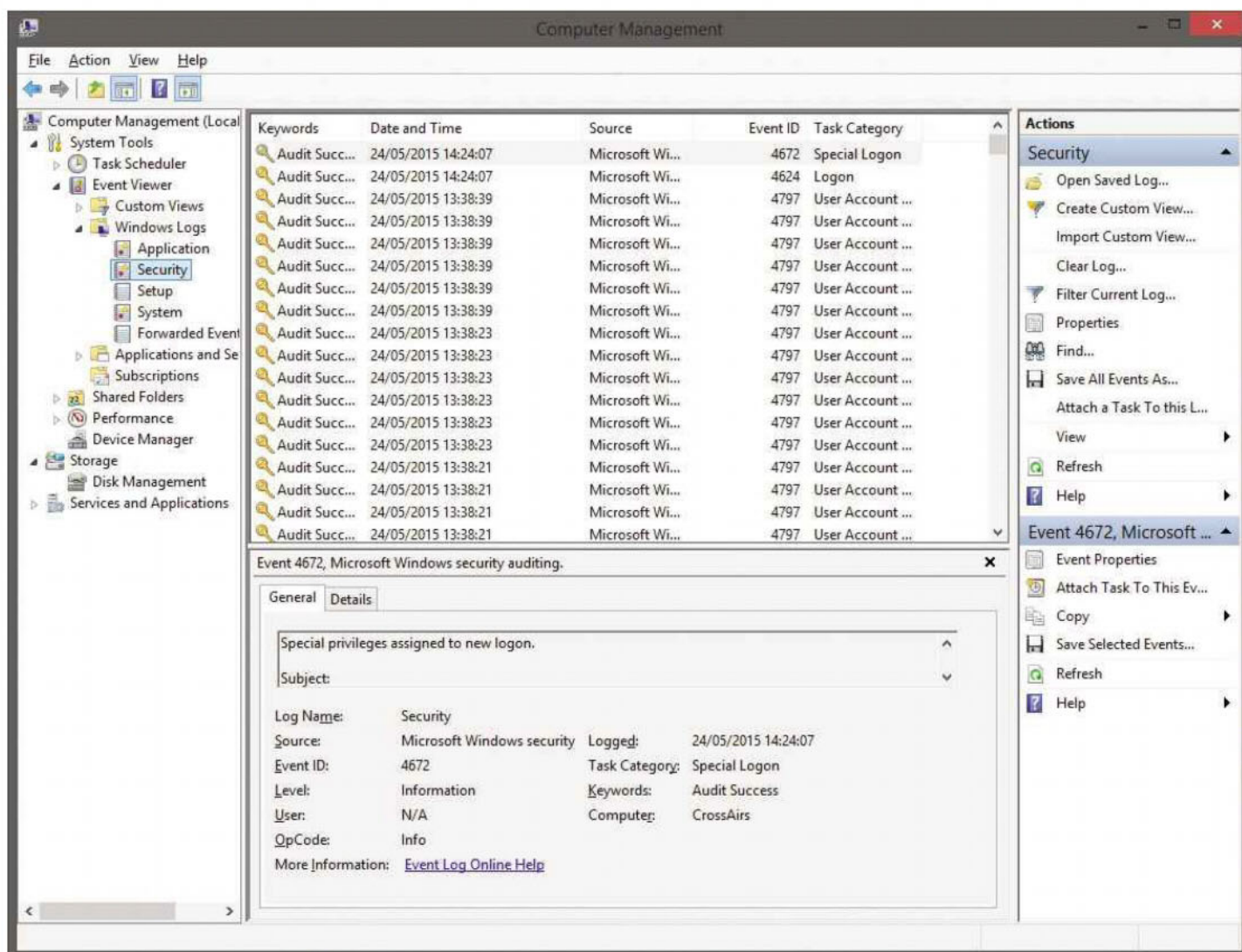
the PC in the time it was stolen, there should be no logs dated during that time. Likewise, you can have a look at file access dates to see if anyone has opened anything during the week.

Even then, I'd personally still be more than a little concerned, and if it was my laptop, I'd feel much more secure by wiping it with a format so I could reinstall from scratch. This is probably the best way, other than swapping out the whole hard disk, which may be a bit much, to be sure it's clean.

“ You can never be too safe in terms of your personal data ”

The bottom line here is that you can never be too safe in terms of your personal data, doubly so in situations like these. It's excellent that you got the laptop back, though. It's fairly rare to see such thefts returned like that, so well done to all involved.

▼ **Windows' Event Viewer is an easy way to see if a system has been used at set dates**



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Cracking The Code

My daughter owns the admin account on the family's PC and unfortunately she's forgotten her password. The owners of the other three accounts can use the PC as normal, but of course my daughter's locked out. Also, the password's needed to make any software changes, so we can't even set up a Wi-Fi dongle.

On Windows XP and Windows 7 I could reset passwords with a boot CD containing various system tools, but the OS in play here is Windows 8.1. The tools don't work. A last resort will be to back up needed data and completely reinstall, but that will take an absolute age.

I've taken the PC to two local repair shops and on both occasions I've been told it's nearly impossible to reset passwords in Windows 8.1. Apparently, experts in the field are still trying to find a way to do it. I'm surprised. I find it difficult to believe it can't be done somehow or other, or is Windows 8.1 really that secure?

Bryan Jones, Virgin Media

In recent years Microsoft has worked hard to make Windows more secure. Often this has been at the expense of user-friendliness, causing yells of disgust from customers. Sadly, I think it's the case that security and user-friendliness are mutually exclusive – you can't have one if you have the other. The only way isn't Essex but compromise.

*One outcome of this is that resetting account passwords in Windows 8.x isn't really any more difficult than it was before. * That's my understanding, anyway. What tools have you tried, Bryan? I've only used it on Windows 7 and earlier, but it seems the favourite for Windows 8.x is Offline NT Password & Recovery Editor. Grab it here: goo.gl/Q8TRU0.*

If you don't get three cherries in a line with that one, take a look at Windows Password Unlocker: goo.gl/uNG2EG. Unlike the first tool, this isn't free, but a \$19.95 outlay (about £13) might be worth the gamble if there's a chance you won't have to waste a weekend on a total reinstall.

“Microsoft has worked hard to make Windows more secure”

Bear in mind that the above procedures apply only to local accounts – that is, traditional Windows accounts, stored on the PC itself. In Windows 8.x, users can also log in with their Microsoft accounts, where the credentials are stored in the cloud. Resetting the password for a Microsoft account should be just a matter of requesting an email via the onscreen prompts. Of course, the user will need access to the email account provided when setting the account up, but that should be a given if there's no foul play afoot.

** And as before, you can reset a password but not recover it. In most cases, that distinction doesn't matter.*

▼ It's not pretty, but Offline NT Password & Recovery Editor can be a real sight to behold if you've forgotten a Windows account password

```
-rwxrwxrwx 1 0 0 14680064 Mar 21 2013 SYSTEM
drwxrwxrwx 1 0 0 8192 Mar 30 2012 TxR
drwxrwxrwx 1 0 0 4096 Mar 16 2011 systemprofile

Select which part of registry to load, use predefined choices
or list the files with space as delimiter
1 - Password reset (sam system security)
2 - RecoveryConsole Parameters (software)
q - quit - return to previous
[1]
Selected files: sam system security
Copying sam system security to /tmp

=====
Step THREE: Password or registry edit
=====
chntpw version 0.99.6 110511 : (c) Petter N. Hagen
Hive <SAM> name (from header): \SystemRoot\System32\Config\SAM
ROOT KEY at offset: 0x001020 * Subkey indexing type is: 686c (1f)
File size 262144 (400000) bytes, containing 7 pages (+ 1 headerpage)
Used for data: 270/53800 blocks/bytes, unused: 9/7416 blocks/bytes.

Hive <SYSTEM> name (from header): \SYSTEM
ROOT KEY at offset: 0x001020 * Subkey indexing type is: 686c (1h)
File size 14680064 (800000) bytes, containing 2822 pages (+ 1 headerpage)
Used for data: 281213/13159032 blocks/bytes, unused: 7583/1213840 blocks/bytes.

Hive <SECURITY> name (from header): \enRoot\System32\Config\SECURITY
ROOT KEY at offset: 0x001020 * Subkey indexing type is: 686c (1f)
File size 262144 (400000) bytes, containing 7 pages (+ 1 headerpage)
Used for data: 400/22080 blocks/bytes, unused: 11/6368 blocks/bytes.

* SAM policy limits:
Failed logins before lockout is: 5
Minimum password length : 8
Password history count : 6

<>=====<> chntpw Main Interactive Menu <>=====<>
Loaded hives: <SAM> <SYSTEM> <SECURITY>
1 - Edit user data and passwords
_ _ _ _ _
9 - Registry editor, now with full write support!
q - Quit (you will be asked if there is something to save)

What to do? [1] -> _
```


It's A Setup

I recently bought a Lenovo Core i3 tower to replace my old Acer Core 2 Duo model. It's running Windows 8.1, and I've tried my best to get used to it. But I've had enough. I've installed Classic Shell and got back the Start menu, and that's eased the pain somewhat, but I've decided to install Windows 7. I have a full retail copy, including an unused product key, but for some reason I can't boot from the setup disc. Even though I've got the DVD drive as the first boot device, the disc is just ignored. Any ideas?

Ron, Gloucestershire

This is all to do with Secure Boot, Microsoft's attempt to make PCs less vulnerable to rogue software. Your query ties in nicely to Bryan's, above, as both of the password-resetting tools I've mentioned require the PC to be started up from a boot CD, so Bryan could well find himself in the same moat.

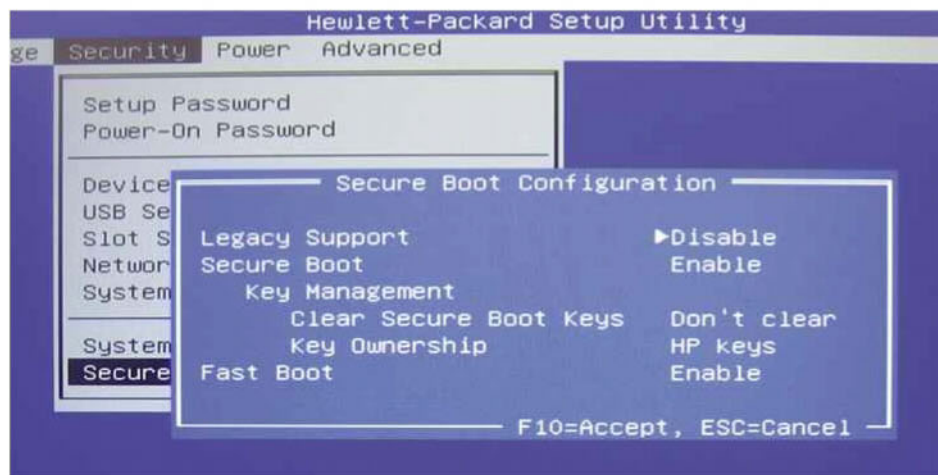
Secure Boot is a feature of all PCs that come with Windows 8.x pre-installed, and it's closely tied to the UEFI, the new-style BIOS. With Secure Boot enabled, a PC will only boot from a source that contains a

security key the UEFI recognises. All other sources will be ignored – just as you're finding, Ron. Although PCs carrying Windows 8.x stickers are obliged to ship with Secure Boot enabled, almost all allow it to be switched off.

What you need to do is enter your Lenovo's UEFI or BIOS (by the sound of it, you're already familiar with this). I don't know the exact tower you've got, so I can't guide you too well, but wade

through all the settings until you see the Secure Boot option. Disable it. If you've still no joy, enter the UEFI or BIOS again and find the boot-mode option. Change it from UEFI to CSM ('compatibility support module'). Microsoft has a useful guide if you get stuck: goo.gl/hyVlhf.

▼ **Secure Boot can cause the uninitiated to tear their hair out when trying to boot from 'legacy' media**



Blaster From The Past

I play the guitar and want to record myself with backing tracks using Mixcraft. On the recommendation of a friend in a band I've bought a Creative Sound Blaster Audigy 2 ZS I/O panel, giving me various inputs and MIDI, and a Creative E-Mumbai DSP PCI sound card. The two are linked together by a ribbon cable. Despite numerous email exchanges with Creative, however, I'm still no nearer to getting these products to work. In short, there don't appear to be any Windows 7 drivers. Can you help?

Rick, Gmail

Creative has a bad reputation when it comes to driver support. The Audigy 2 ZS hit the streets back in 2003, a time when even Windows XP was barely out of short trousers, so I figured you'd be scuppered regarding Windows 7. But no: see goo.gl/gTSDHD. I'm unsure how good these drivers are – I think they might be rebadged Vista affairs. However, a very clever fellow going by the handle Daniel K has modified them and made them a whole lot better. See goo.gl/wjK7Q7.

If I'm reading things right, though, Rick, it's just the Audigy 2 ZS breakout box you've bought, not the actual sound card. Your sound card is this DSP job from E-mu – not E-Mumbai (predictive text?)! – and that's a different kettle of chips altogether. E-mu was its own master until Creative bought it in 1993, but for years it's been just a branding exercise (a brand that's practically disappeared). Those PCI cards herald from 2004, and it looks as though there are no drivers at all beyond Windows XP: goo.gl/7shQdT. There are PCIe versions of some cards, but driver support doesn't appear to be any better.

All in all, I'm not sure why your friend has sent you in this direction. You may be able to dig yourself out of the hole by purchasing the actual Audigy 2 ZS sound card. This uses the exact same EMU10K2 DSP chip as found on the E-mu cards, so along with those third-party drivers I mentioned, you might get lift-off. Also, I believe these drivers are ASIO-compliant (as are the official Creative ones), giving you the low latency essential for music production. Your only alternative is to start from scratch and buy some hardware that's more up to date. Sorry.

▼ **Creative Labs, with its famous Sound Blaster range, was once a goliath of the PC industry, but where is it now?**



Crowdfunding Corner

If you demand more from your technology, this pair of quality-conscious Kickstarter projects will help you get it, from high-resolution inputs to high-resolution outputs

Phree

You've heard of e-paper and e-ink, but how about an e-pen? Phree is a pen that allows you to draw and take notes on virtually any surface, converting your input into a data signal, which can be read by almost any device with Bluetooth capabilities.

Already compatible with apps like Office, OneNote, EverNote, Acrobat, Google Handwriting Keyboard, Viber and more, Phree allows you to sketch or jot down ideas, notes, thoughts, email addresses and phone numbers whenever and wherever you are. It also functions as a headset for making calls with and has an integrated screen to display texts and alerts. You can even respond directly by just writing your reply!

At just 30 grams, Phree is light enough to use for extended periods of time, and its case has embedded wireless charging, so convenience is at the top of its list of priorities. The case's cap even converts into a stand for any smartphone so you can create a mobile workstation!

The project is currently heading for six times its \$100,000 target, and predictably the early bird backer tiers have all been used. You can still pick one up for \$168 (£109) without a case and \$219 (£143) with one. That price includes shipping anywhere in the world, so while it's not exactly low, it's still quite reasonable – and this is a gadget people are going to want.

URL: kck.st/1F164uc

Funding Ends: Friday, 26th June 2015

OnBlink Amplifier

The sound quality on portable devices is still quite poor, and part of the reason for that is the low quality of DAC (Digital to Analog/Audio Converter) devices inside laptops and tablets themselves. This limits the potential quality of an audio signal, largely because manufacturers prefer to preserve battery life rather than sound quality.

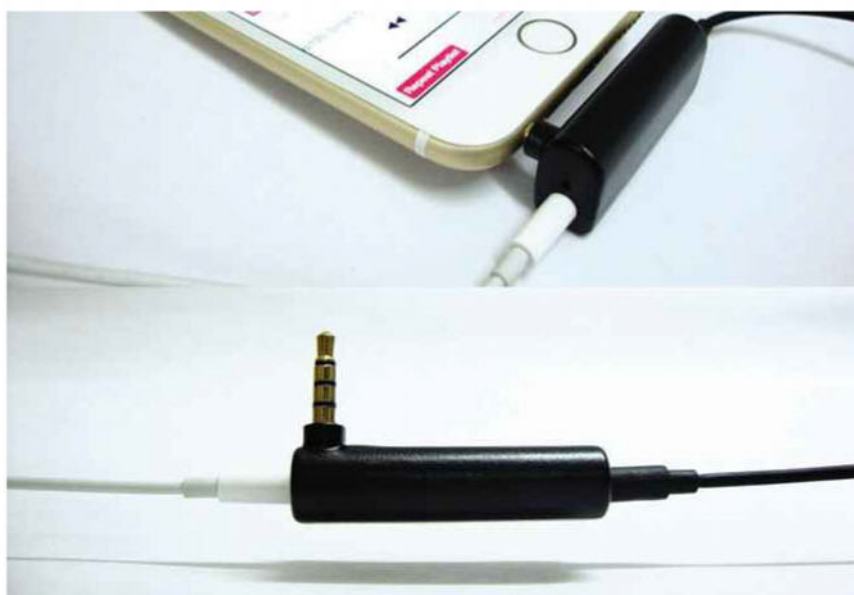
If you're a stickler for quality, OnBlink may have the hardware for you: the OnBlink Mini Amplifier and the OnBlink Plus Digital to Analog (DAC) Converter and Amplifier, both of which give you the chance of louder and/or better quality sound. Especially if you're using large headphones, this will give you the performance you've been chasing.

Both devices support multiple headphones and have built-in batteries, so your smartphone, tablet or laptop doesn't have to shoulder the burden.

The project has already breezed past its £8,000 target with over a month to go, so it's likely the project will do well. Early bird tiers are still available, and you can get the OnBlink Mini for as little as £35 and the OnBlink Plus for £65. The hardware ships in August this year, so there's not even long to wait!

URL: kck.st/1FP2w1L

Funding Ends: Thursday, 2nd July 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

SURE Universal Remote

This week, **David Hayward** takes control of his wayward devices

We were taking about things to do with an old phone or tablet the other week, where we looked at turning one into a surveillance system. Since then, we've found a number of other ways to give an old device a new lease of life – far better than it sitting in a drawer or going to landfill.

Our quest this week was to create the ultimate remote control. As before, there are a number of apps available in the Google Play store, but the one that stood out for us is the SURE Universal Remote from Tekoia Ltd.

Just to be SURE

SURE Universal Remote is quite an impressive free app. With it you can command your wi-fi smart TV, infrared digital media devices and any home automation appliances you may have installed.

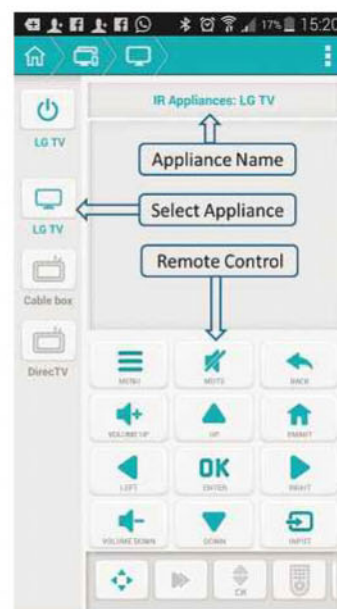
It'll replace your standard TV remote for LG smart TVs, Roku boxes, Samsung smart TVs, Apple TV boxes and Google Chromecast devices. It'll work as a keyboard and mouse for each of these devices, as a microphone for voice control, and it'll pick up anything that's currently hooked up to your home network.

As well as the basic remote control functionality, it also supports picture, video and music streaming from the smartphone or tablet to the TV or other device, and it can even control audio equipment.

In terms of the home automation control, it will pair up with any device that's connected to the network, as well as any that can be accessed using a more traditional IR method. In fact, you can even control some makes of robots.

Features At A Glance

- SURE Universal Remote can control around a million IR appliances such as TVs, amplifiers and cable boxes, eliminating the need for multiple remotes in your living room.
- Supports streaming of pictures, videos and music from your smartphone to your smart TV such as the LG smart TV and Samsung smart TV.
- SURE integrates with streaming products such as Roku, Apple TV and Google Chromecast to display pictures, videos and music to non-smart TVs.
- SURE is the stress-free way to take control of your connected home.



▲ You can take control of your connected home, with SURE Universal Remote



▲ It's easy to find and add a new IR device

SURE Universal Remote is remarkably simple to use, but it's an extremely effective solution for anyone who has multiple devices. If you're anything like us, then powering up the set of devices requires digging around to get hold of the right remote for the right device. A quick count under our TV revealed six different remotes, which isn't a lot, but when we factor in the other eight from various rooms around the house it gets a little annoying, especially if one of the remotes goes for a walk to another room and you have to get up and try to locate it.

Traditional universal remotes are an option, but we've often found them to be a little hit and miss, and they have the tendency to forget which device they're programmed in to.

Conclusion

In our mind, using SURE Universal Remote is an ideal solution to the problem of connecting to and controlling multiple devices. It's fast to respond to commands, easy to use and can control lots of different appliances from a single, unobtrusive device. If you're interested, then check it out at goo.gl/rMdfYF.

Logging Off

Writing in a technical publication, it's easy to confuse people, because we all harbour expectations or 'world models' that we're unwilling to alter when reality contradicts our prior assumptions. Everyone expected the follow-up to Windows 8.x to be Windows 9, for example. And lots of people are still not sure why Apple's watch is called 'Watch' and not iWatch or iChronograph even.

I'm mentioning this because I'd like to talk about Apple TV. And to complicate matters that's not the streaming TV box product that it's sold for some years.

No, I'm talking about the actual television with the Apple logo, the one that fans of that company have been expecting for at least six or more years.

As we cross the boundary of each new year, I usually write a feature about upcoming products, and always in there I ask 'Will this be the year that the Apple TV actually arrives?'

Thankfully, that won't be necessary any longer, because I can say with some certainty this or any other subsequent year won't be that one.

Back in 2009 the first mentions of a TV product surfaced, with various analysts concluding that the product would arrive promptly in 2011. And every year since, while no official announcements confirmed it, the 'coming soon' status of this product reached XXXL5 girth.

The source for much of this speculation was the small but vocal selection of Wall Street Journal pundits that Apple likes to schmooze with freebies while feeding them with choice titbits about where the company is heading next. And like they've been programmed to deliver, these people have been talking about Apple TV, and how you shouldn't buy a big TV now, because this amazing device is just around the corner.

A few other people have confirmed that a research and product development team have worked on a TV, with the latest information being that it will be 4K and linked to a super new Ultra HD content delivery service.

But it won't, because Apple read these particular tea leaves and saw what a mess TV manufacturing has made of other companies (like Sony) and canned the whole exercise. No, seriously, it was in the Wall Street Journal. Yes, the same people who have been stirring this pot vigorously for six years had to fess-up to their

EDITORIAL

Editor: Anthony Enticknap
theeditor@micromart.co.uk

Designer: Laura Jane Gunnion

Designer: Kevin Kamal

Bonus John: John Moore

Contributors: Mark Pickavance, Robert Leane, Jason D'Allison, Joe Lavery, Sven Harvey, Simon Brew, Dave Edwards, Ryan Lambie, James Hunt, Mark Oakley, Ian Jackson, Roland Waddilove, Paella, Burritos, Sarah Dobbs, David Hayward, Michael Fereday, Ian McGurran, Aaron Birch, David Briddock, Ian Marks, Craig Grannell, Kevin Pocock, Andrew Unsworth, Keir Thomas

Caricatures: Cheryl Lillie

ADVERTISING

Group Ad Manager:

Andrea Mason
andrea_mason@dennis.co.uk

Senior Sales Executive:

Karl Taylor
Tel: 0207 907 6706
karl_taylor@dennis.co.uk

Sales Executive:

Joe Teal
Tel: 0207 907 6689
joe_teal@dennis.co.uk

US Advertising Manager

Matthew Sullivan-Pond
matthew_sullivan@dennis.co.uk

MARKETING

Marketing Manager:

Paul Goodhead
Tel: 0207 907 6393

PRODUCTION

Production Coordinator:

John Moore
Tel: 0207 438 2074
MicroMartAdCopy@gmail.com

Digital Production Manager:

Nicky Baker

SUBSCRIPTIONS

Save 24% on the cover price:
£77.50 for 51 issues by credit card.
Visit subscribe.micromart.co.uk
Tel: 0845 126 1014

ONLINE SUBSCRIBER SERVICE

www.subsinfo.co.uk

Change your address, renew subscription or report problems: call 0844 844 0082 (UK) or email micromart@servicehelpline.co.uk

NEWSTRADE SALES

Newstrade Director:

David Barker

DENNIS PUBLISHING

Group Publisher:

Paul Rayner
paul_rayner@dennis.co.uk

Managing Director:

John Garewal

Group Managing Director:

Ian Westwood

COO: Brett Reynolds

CEO: James Tye

Company Founder: Felix Dennis

PUBLISHED BY Dennis Publishing

30 Cleveland Street
London
W1T 4JD
Tel: 0207 907 6000
www.dennis.co.uk

PRINTING

Printed By: BGP

Distributed By: Seymour

Certified Distribution:

13,712 average copies
Jan-Dec 2010





readers and solemnly explain that the Apple TV (not the streaming box) was dead, bereft of life, pushing up the foam packing. The reasoning was provided, that despite its best efforts, it couldn't find a meaningful way to differentiate its TV from all the others out there.

What Apple fans need to rationalise is that the margins that their favourite company likes would make this the most expensive TV around, and therefore in such a competitive market, some justification for the double or more price was required.

Even Apple accepted that sticking its logo on it probably wasn't enough, and given the downward direction that screen costs are heading in, it could get stuck with an expensive flop.

While many are disappointed, I think this is actually rather good news for investors, because if Apple still knows when to walk away before real money is spent, that's a good thing, even if from the outside the product seemed compelling.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 1 Nano, 3 Resonate, 9 Upturns, 10 No-WWW, 11 Invigilators, 13 Ursine, 15 Bonsai, 17 Permutations, 20 Input, 21 Unreeve, 22 Porky-Pie, 23 Pion.

Down: 1 Nautilus, 2 Net TV, 4 Easels, 5 Ornithopters, 6 AdWords, 7 Edvy, 8 Trigonometry, 12 Einstein, 14 Stepper, 16 Mt Fuji, 18 Obeli, 19 Gimp.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. Now that the sun is starting to poke its head through the clouds a bit and we're getting some actual proper sunshine, we decided we'd spend some of our free time taking advantage of it – by flying a kite. But rather than use the basic, single-line kite we already had, we thought we'd try something a bit more

adventurous, so we bought a brand spanking new dual-line parafoil, which we eagerly took to the local park. Sadly, the tiny breeze we had didn't quite cut it, so we returned home, but the next day we had another crack at it, and it was far more successful. And when we say successful, we mean not really successful at all. It did get in the air briefly, but then spun around a few times, tangling the two lines, before unceremoniously smashing itself into the ground. Then the wind stopped, but by that time we'd managed to get the lines hopelessly tangled, so we spent a good hour trying to untangle them, during which time an apparent mini-hurricane decided to pass through town, exiting just as we'd got the lines free. Typical.

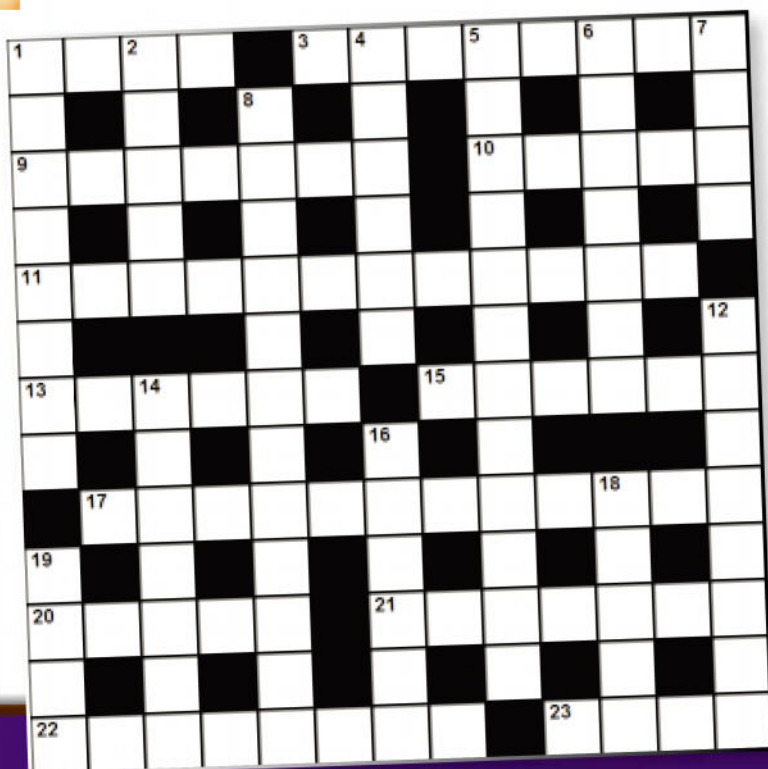
THIS WEEK'S CROSSWORD

Across

- 1 A large brass wind instrument of bass pitch, with three to six valves and a broad bell typically facing upwards. (4)
3 Inspiring great affection or delight. (8)
9 The use of a hand movement to communicate a familiar signal or trigger a touchscreen action. (7)
10 The nickname for a gold statuette given as an Academy Award. (5)
11 Incomprehensible technical jargon. (12)
13 The 'Father Of Geometry'. (6)
15 A hereditary military dictator of Japan. (6)
17 A period of time during which a person refrains from using electronic devices such as smartphones or computers, regarded as an opportunity to reduce stress. (7,5)
20 Widely used free and open-source forum software. (5)
21 Mini biography to establish an individual's identity in a Web 2.0 environment. (7)
22 Become conscious of. (8)
23 A form of energy arising from the random motion of the molecules of bodies, which may be transferred by conduction, convection or radiation. (4)

Down

- 1 Assembled in one place. (8)
2 A once popular programming language that is relatively easy to learn. (Acronym) (5)
4 Slang term for insignificant students who are ridiculed as being affected or boringly studious. (6)
5 A solid figure whose faces are six equal rhombuses. (12)
6 An accumulation of jobs not done or materials not processed that are yet to be dealt with. (7)
7 #C2B280 or R194, G178, B128 if you prefer. (4)
8 Capable of being measured. (12)
12 Lacking professional skill or expertise. (8)
14 A tool for making solderless connections in wiring. (7)
16 Famously deployed the Caro-Kann Defence against a PC at Harvard in 1990. (6)
18 Overfamiliar through overuse. (5)
19 A musical genre originating in South Korea that is characterised by a wide variety of audiovisual elements. (1-3)



In Next Week's Micro Mart*

- How to speed up your PC for free!
- Overclocking: do the rewards justify the risks?
- How will Microsoft's HoloLens fare against the competition?
- Plus the usual mix of news, reviews and advice



* May be subject to change

Gaming Starts Here



SAPHIRE R7 250X



Vapor-X R9 270X

HD Gaming starts here. Award winning Vapor-X cooling designed for gamers. 2GB of 256 bit GDDR5 memory with BOOST.



Vapor-X R7 250X

Gaming starts here. Experience premium multimedia, play MOBA games @ 100 fps! Award winning Vapor-X cooling designed for gamers.

SAPHIRE Vapor-X™ Cooling Designed for Gamers

The SAPHIRE R9 270X and R7 250X Vapor-X Graphic Cards

RADEON™ is gaming.



SAPHIRE

www.sapphiretech.com

©2014 SAPHIRE Technology LTD. All rights reserved. AMD, the AMD Arrow logo, Radeon and combinations thereof are trademarks of Advanced Micro Devices, Inc. ©2014 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, AMD OverDrive, Radeon and combinations thereof are trademarks of Advanced Micro Devices, Inc. Microsoft and DirectX are registered trademarks of Microsoft Corporation in the United States and/or other jurisdictions. Other names are for informational purposes only and may be trademarks of their respective owners.



ThinkCentre

- Quad Core i5-2400 3.1GHz
- 4-16GB Memory
- Solid State Drive as option
- Genuine Windows

from **£239.90** inc VAT



Scan me with your smart phone



Gaming ready PCs

We offer the most affordable Gaming Desktop Computers

from **£139.90** inc VAT



Gaming advanced PCs

- Quad Core Processors
- Huge Memory RAM
- GTX 750 Ti Graphics
- Genuine Windows 7

from **£219.90** inc VAT

Refurbished Computers are helpful to families, students, businesses and good for the environment!



iPad

with Retina display
Just as stunning. Twice as fast.



- 4th Gen
- WiFi
- iOS 8.1



Scan me with your smart phone

£219.90 inc VAT



lenovo FOR
THOSE WHO DO.

£199.90 inc VAT

CORE i5 2.40GHZ

4GB DDR3

160-320GB

14.1" WIDESCREEN



Scan me with your smart phone

Call 01803 269 861 or
Visit our store
MICRODREAM.CO.UK
Go Online for the latest offers!

Our customers love us!



We have loads of great customer reviews

